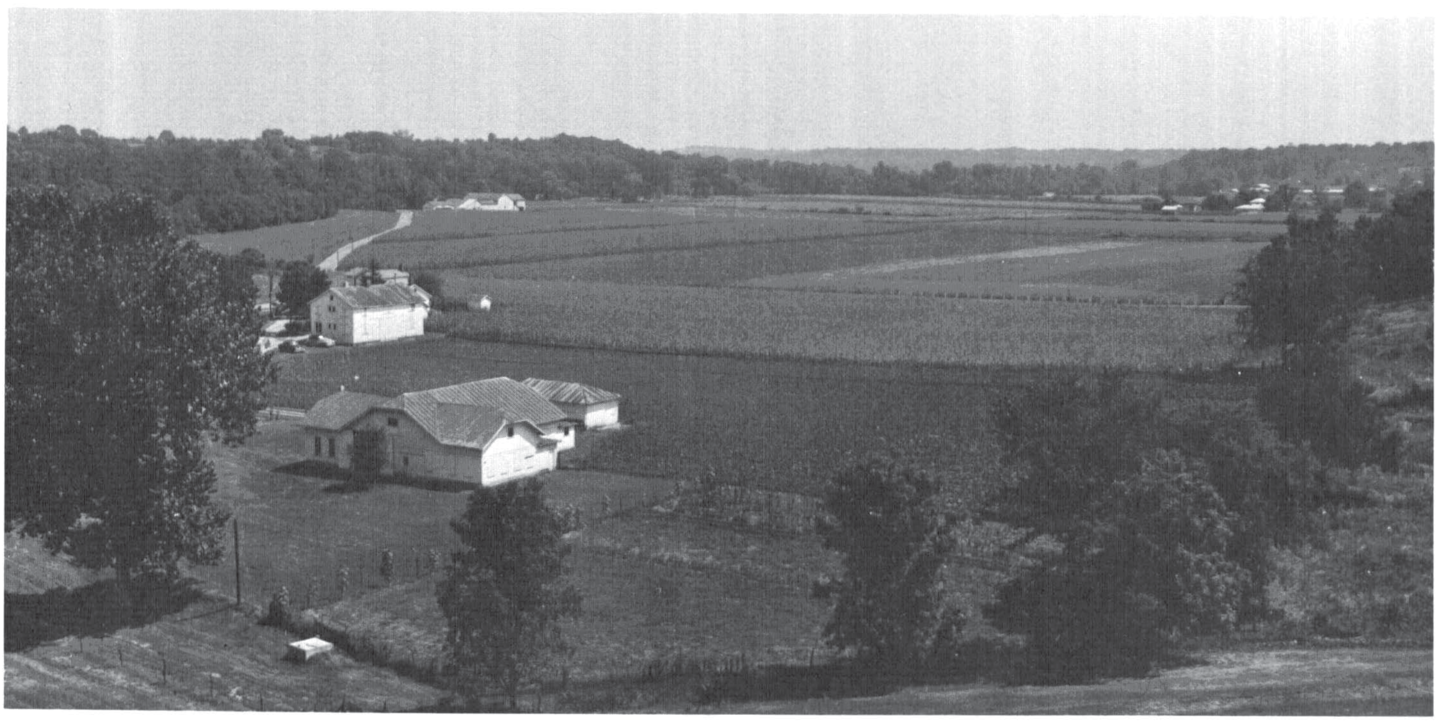
SOIL SURVEY OF

Montgomery County, Ohio



United States Department of Agriculture
Soil Conservation Service
In cooperation with
Ohio Department of Natural Resources
Division of Lands and Soil and
Ohio Agricultural Research and Development Center

Major fieldwork for this soil survey was done in the period 1958–67. Soil names and descriptions were approved in 1969. Unless otherwise indicated, statements in this publication refer to conditions in the county in 1966. This survey was made cooperatively by the Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center. It is part of the technical assistance furnished to the Montgomery Soil and Water Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Montgomery County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units.

Foresters and others can refer to the section "Woodland Uses of the Soils."

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife."

Community planners and others can read about soil properties that affect the choice of home, industrial, and recreation sites in the section "Town and Country Planning."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils were formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in Montgomery County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given in the section "General Nature of the County."

Cover: **Flood plain along Twin Creek. The dominant soil is Ross silt loam.**

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SOIL SURVEY OF MONTGOMERY COUNTY, OHIO

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE OHIO DEPARTMENT OF NATURAL RESOURCES, DIVISION OF LANDS AND SOIL, AND THE OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER

MONTGOMERY COUNTY, in the southwestern part of Ohio (fig. 1), occupies 465 square miles, or 297,600 acres. Dayton is the largest city and is the county seat. The population of Dayton numbered 262,332 in 1960. The metropolitan Dayton area numbered more than 325,000 in 1960. The county population in 1960 was 527,080. Twelve smaller towns lie out in the more rural areas.

The county lies entirely in the region in Ohio that was glaciated in the Wisconsin Age. The northern and western parts of the county are nearly level or gently rolling till plains. Elevation ranges from 680 to 1,100 feet above sea level. The Miami River and its tributaries dissect and drain most of the county, except for the southeastern corner, which is part of the Little Miami watershed.

Farming is no longer the major industry in the county. The core of urban and suburban Dayton furnishes 60 percent of the housing and about 99 percent of the employment of the people. Farming is carried out on about half of the county acreage, but the gross annual income from this source is dwarfed by that of neighboring industries, though its products help to feed the greater part of the population. Livestock, corn, soybeans, and wheat are the major products. Truck, nursery, greenhouse, and specialty crops are important locally, but finding areas of soils particularly suited to growing these crops is increasingly difficult because community and industrial development is proceeding on the soils that are well suited to these crops.

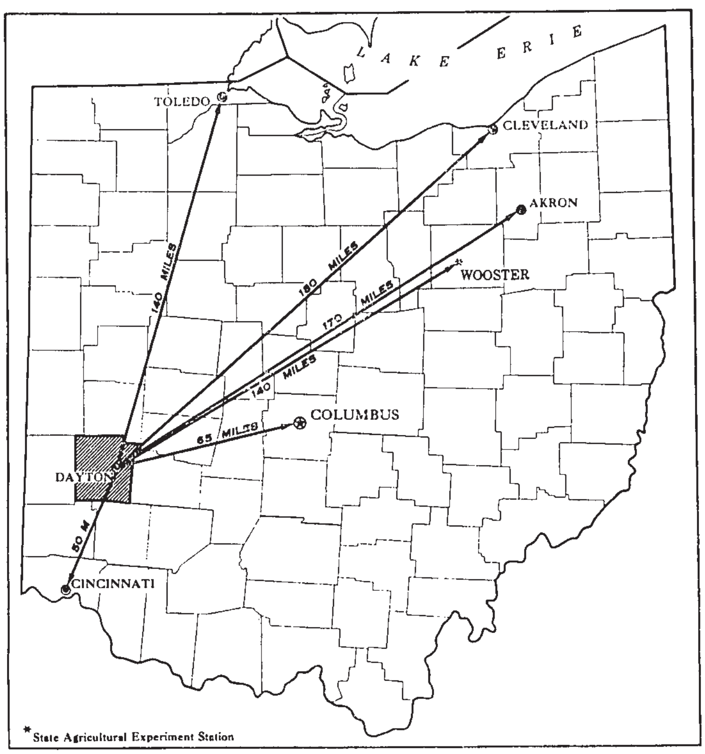

Figure 1.—Location of Montgomery County in Ohio.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Montgomery County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The soil series and the soil phase are the categories of soil classification most used in a local survey (*14*).[1]

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Miamian and Brookston, for example, are the names of two soil series. All the soils in the United States having the same series

[1] Italic numbers in parentheses refer to Literature Cited, p. 106.

name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Miamian clay loam, 12 to 18 percent slopes, severely eroded, is one of several phases within the Miamian series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Montgomery County: soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Brookston-Urban land complex is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Hennepin and Miamian silt loams, 25 to 50 percent slopes, moderately eroded, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Quarries is a land type in Montgomery County.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of users, among them farmers, managers of woodland and rangeland, and engineers.

On the basis of yield tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Montgomery County. A soil association is a landscape that has a distinctive pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The nine soil associations in Montgomery County are discussed in the following pages. It should be noted that the soil associations shown on the general soil map of this county do not exactly match those on the general soil maps of the Preble County and Warren County published soil surveys. The major soils are similar or the same, but they occur in a slightly different pattern.

1. Lewisburg-Brookston-Pyrmont association

Deep, nearly level to moderately steep, well-drained to very poorly drained soils that have a moderately fine textured and fine textured subsoil; formed in thin loess and glacial till

This association consists of soils that dominantly are nearly level to gently sloping and occur on stream-dissected till plains, or they are gently sloping to moderately steep along the larger waterways.

This association occupies less than 1 percent of the county (fig. 2). About 30 percent of this is Lewisburg soils, 30 percent is Brookston soils, 20 percent is Pyrmont soils, and the remaining 20 percent is other soils.

The well drained and moderately well drained Lewisburg soils and the somewhat poorly drained Pyrmont soils have a thin, clayey subsoil and are shallow over cal-

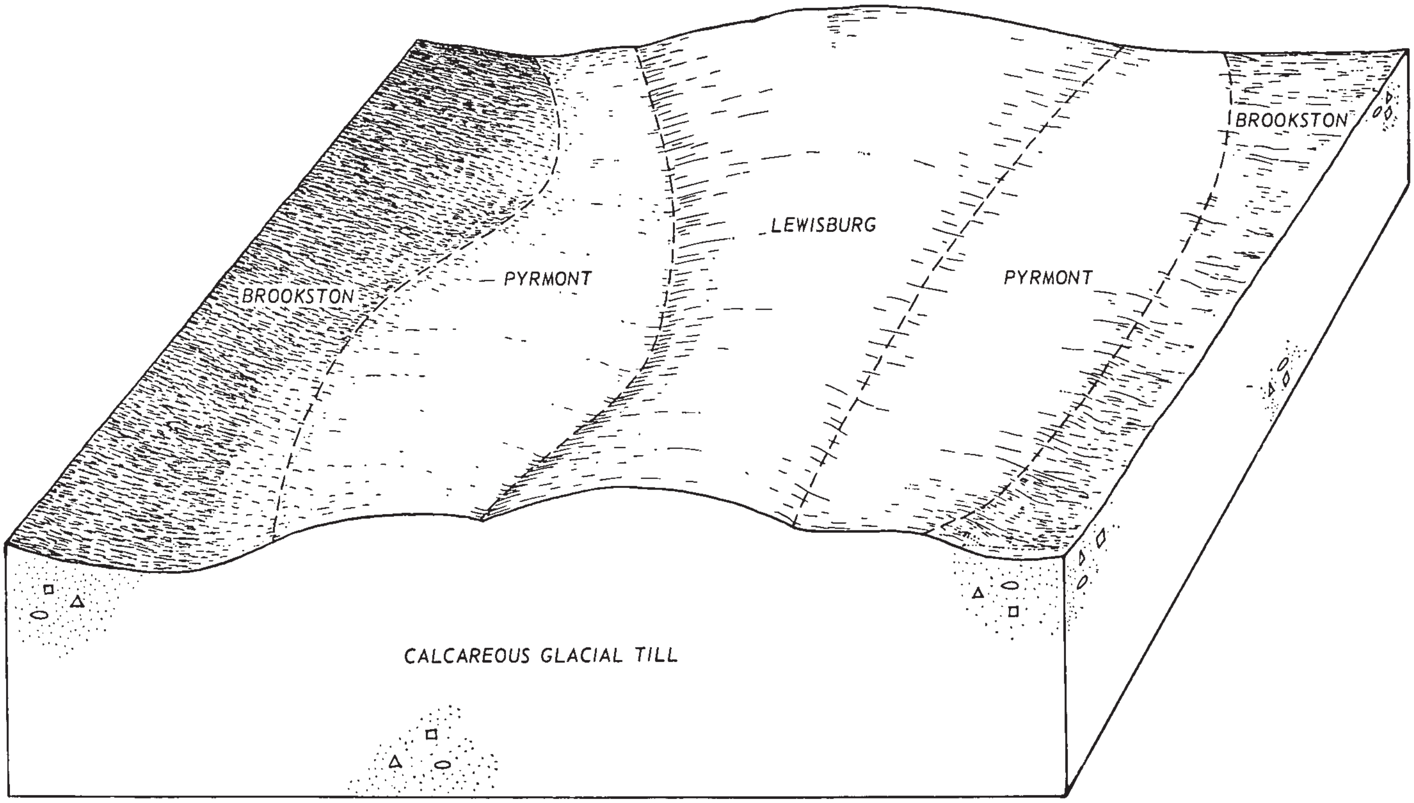

Figure 2.—Typical pattern of soils and underlying material in association 1.

careous till. Lewisburg soils are on knolls between drainageways and are gently sloping adjacent to larger drainageways. Pyrmont soils are nearly level. Brookston soils are deep, nearly level to depressional, dark colored, and very poorly drained. The Brookston soils are adjacent to the lighter colored Lewisburg and Pyrmont soils.

Other soils in this association are the moderately well drained Celina soils, the well drained Miamian soils, and the somewhat poorly drained Crosby soils.

Brookston and Pyrmont soils are seasonally wet and need to be artificially drained. Erosion is a hazard on Lewisburg soils.

Most of the area in this association is farmed. The main farm enterprises are dairying or cash-grain farming, but some hogs and beef cattle are raised. A few areas, chiefly the steeper slopes, are used for pasture or woodland. Moderately slow or slow permeability and seasonal wetness are the major limitations for farm crops.

2. *Miamian-Celina association*

Deep, mainly gently sloping to moderately steep, well drained and moderately well drained soils that have a moderately fine textured and fine textured subsoil; formed in thin loess and glacial till

This association consists of nearly level to rolling areas on the glacial till plain and hilly moraines dissected by streams. It is in all parts of the county except in the northwestern and southeastern corners.

This association occupies about 51 percent of Montgomery County. About 55 percent of this is Miamian soils, 20 percent is Celina soils, and 25 percent is other soils.

The Miamian and Celina soils (fig. 3) are moderately deep to calcareous till. The Miamian soils are well drained, and the Celina soils are moderately well drained. The Miamian soils typically occupy knolls and are rolling to moderately steep adjacent to drainageways. The Celina soils are gently sloping.

Other soils in this association are the somewhat poorly drained Crosby soils, the dark-colored, very poorly drained Brookston soils, the moderately well drained Medway soils, and the shallow, well drained Hennepin soils.

This association is cultivated in a large acreage, and it is important to farming in the county. Most of the farmers are engaged in dairying or cash-grain farming, though beef cattle and hogs are raised on family-sized farms. Scattered woodlots and permanent pasture generally occupy the moderately steep areas of these soils.

The control of runoff and erosion is the main concern in managing the soils of this association for farming. Moderately slow permeability and slope are dominant limitations to many nonfarm uses.

3. *Brookston-Crosby association*

Deep, mainly nearly level to gently sloping, very poorly drained and somewhat poorly drained soils that have a moderately fine textured and fine textured subsoil; formed in thin loess and glacial till

This association occurs in one large, nearly level to undulating area in the northwestern corner of the county and in medium-sized to small areas scattered throughout the rest of the county (fig. 4).

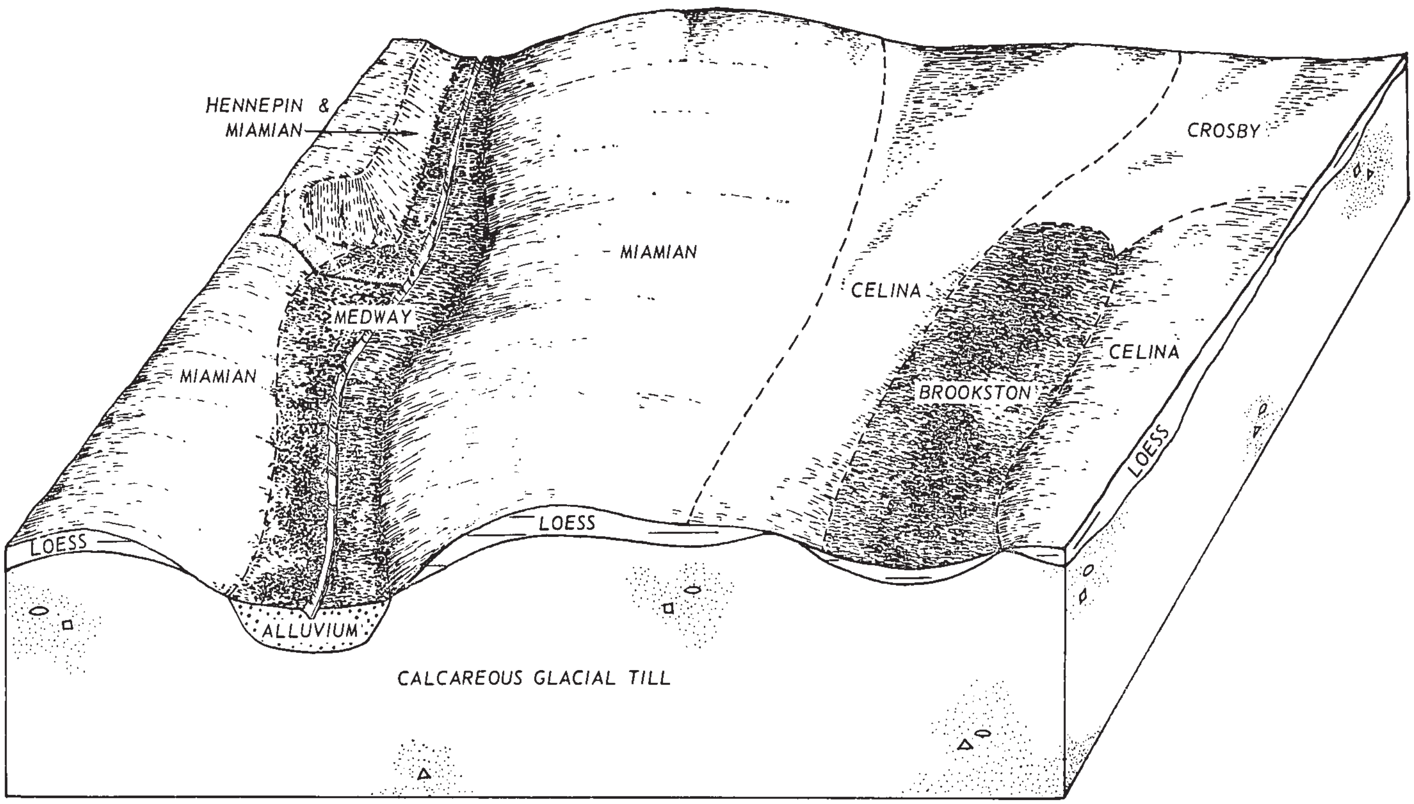

Figure 3.—Typical pattern of soils and underlying material in association 2.

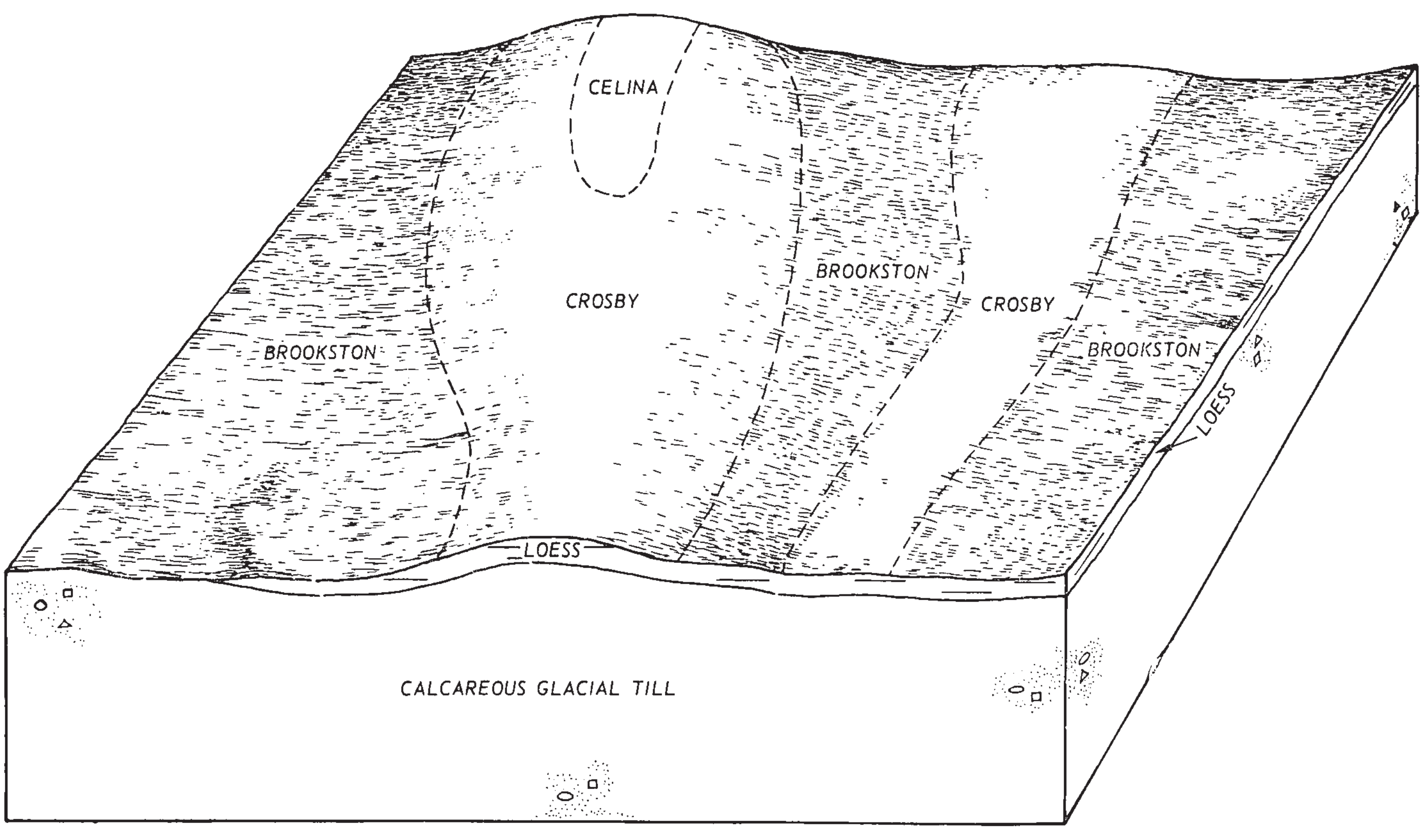

Figure 4.—Typical pattern of soils and underlying material in association 3.

This association occupies about 18 percent of the county. About 60 percent of this is Brookston soils, 25 percent is Crosby soils, and the remaining 15 percent is other soils.

The Brookston soils are dark colored, very poorly drained, and typically nearly level to depressional. The somewhat poorly drained Crosby soils occur on gently undulating, low knolls. They are lighter colored than the Brookston soils and are nearly level to gently sloping.

Among the other soils in the association are Miamian and Celina soils that are steeper than the Brookston and Crosby soils.

Much of this soil association is cultivated. Some of the acreage, mainly undrained areas of Brookston soils, is in trees. Farmers are engaged primarily in cash-grain farming, but they also keep dairy herds and raise beef cattle and hogs. Most of the farms are family farms.

The dominant soils in this association are seasonally wet. Farming is delayed in spring unless the soils are artificially drained. Much of the association is artificially drained by tile. Moderately slow permeability and a seasonal high water table are soil limitations for many nonfarm uses.

4. *Brookston-Fincastle association*

Deep, mainly nearly level to gently sloping, very poorly drained and somewhat poorly drained soils that have a moderately fine textured subsoil; formed in thick loess and glacial till

This association occurs as small, scattered areas in the southeastern part of the county. The major soils of the association are nearly level to undulating and are on till plains (fig. 5). They have a silt or loess capping 18 to 40 inches thick or more.

This association occupies slightly more than 1 percent of the county. About 55 percent of this is Brookston soils, 40 percent is Fincastle soils, and the remaining 5 percent is other soils.

The Brookston soils are deep, dark colored, and very poorly drained. They are nearly level to depressional. The Fincastle soils are deep and somewhat poorly drained. They occupy the slight rises or low knolls between areas of Brookston soils and Xenia soils and have better drainage and a lighter color than Brookston soils.

The rest of the association consists of smaller areas of the moderately well drained Xenia and other soils.

Most of the area in this association is farmed. The main farm enterprise is cash-grain farming. Some beef cattle and hogs are raised.

The major soils in this association are seasonally wet. Farming is delayed in spring unless the soils are artificially drained. Much of the association is drained for farming. Moderately slow permeability and a seasonal high water table are the major limitations of the dominant soils for many nonfarm uses.

5. *Xenia-Russell association*

Deep, mainly nearly level to gently sloping, moderately well drained and well drained soils that have a moderately fine textured subsoil; formed in thick loess and glacial till

This association is in the southeastern part of the county. Most of the association consists of nearly level to gently sloping soils on a till plain. The dominant soils

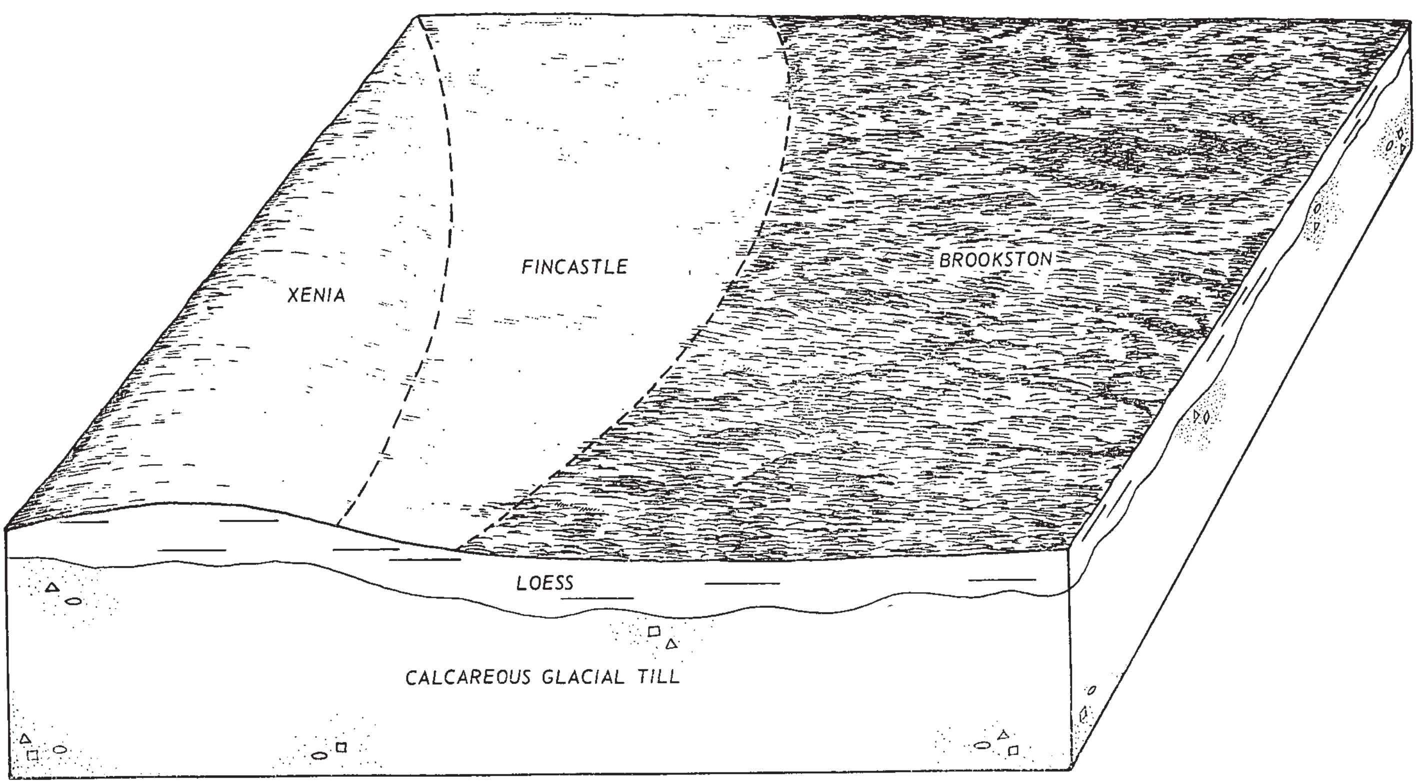

Figure 5.—Typical pattern of soils and underlying material in association 4.

have a silt or loess capping 18 to 40 inches thick. In small areas of this association there are strongly sloping soils along drainageways (fig. 6).

This association occupies slightly more than 6 percent of the county. About 25 percent of this is Xenia soils, 25 percent is Russell soils, and the remaining 50 percent is other soils.

The Xenia soils are deep and moderately well drained. The Russell soils are deep and well drained. Russell soils are steeper than Xenia soils and occupy more elevated positions on the landscape.

Among the other soils in this association are the somewhat poorly drained Fincastle soils and the very poorly drained Brookston soils. Also, the Brookston-Urban land complex and the Miamian-Urban land complex occupy sizable acreages.

The southern part of the association is farmed. The main farm enterprise is cash-grain farming. Beef cattle and hogs are raised, and there is some dairying. The northern part of this association is mostly used for houses and is rapidly being developed.

Control of surface runoff and erosion is the main management concern in the use of the soils of this association for farming. Moderately slow permeability is a limitation for some nonfarm uses.

6. *Milton-Ritchey-Millsdale association*

Moderately deep and shallow, nearly level to very steep, well-drained and very poorly drained soils that have a moderately fine textured and fine textured subsoil; formed in glacial till over limestone

This association occurs in small, scattered areas throughout the county. It consists of bedrock-controlled hills that rise above the till plain and of the walls of stream-cut valleys (fig. 7).

This association occupies about 5 percent of the county. About 55 percent of this is Milton soils, 15 percent is Ritchey soils, and 10 percent is Millsdale soils. The remaining 20 percent is other soils.

The Milton soils are moderately deep, well drained, and nearly level to moderately steep. Limestone bedrock occurs at a depth of 20 to 40 inches. The Ritchey soils are shallow, well drained, and nearly level to very steep. Limestone bedrock occurs within a depth of 20 inches. Millsdale soils are dark colored, very poorly drained, and nearly level to gently sloping. Limestone bedrock occurs at a depth of 40 inches.

The remainder of the association is made up of the well-drained, sloping to very steep Fairmount soils; the somewhat poorly drained, nearly level Randolph soils; the dark-colored, well-drained, gently sloping Plattville soils; and other less extensive soils.

Most areas of the soils in this association are used for crops or permanent pasture. Surface runoff and erosion are the major concerns in management if the Milton and Ritchey soils are farmed. Seasonal wetness is the dominant limitation of the very poorly drained Millsdale soils.

Limestone quarries are in this association. In the Milton, Ritchey, and Millsdale soils, limestone near the surface limits farm and nonfarm uses.

7. *Fox-Ockley association*

Deep, nearly level to moderately steep, well-drained soils that have a moderately fine textured subsoil; formed in loess and loamy outwash underlain by calcareous sand and gravel

This association occupies the nearly level to moderately steep terraces along the major streams and their larger tributaries (fig. 8).

This association occupies about 9 percent of the county. About 75 percent of this is Fox soils, 10 percent is Ockley and Wea soils, and the remaining 15 percent is other soils.

The Fox soils are well drained and moderately deep to calcareous sand and gravel. They are nearly level to moderately steep. Ockley soils are deep to sand and gravel. They are well-drained soils that are nearly level and gently sloping.

The Wea soils are similar to the Ockley soils but are darker colored. Occupying small areas in the association are the Warsaw, Tippecanoe, Thackery, Westland, Rodman, and Lorenzo soils. Some of these soils are shallow to sand and gravel, and some are less well drained than the Fox and Ockley soils.

Much of the acreage in this association has been developed for homes and industry. The part that is still farmed is mostly used for cash-grain crops. Specialty crops, such as fruits and vegetables, are also grown.

The Fox and Ockley soils are well suited to most farm crops. They are, however, susceptible to erosion where they are sloping or moderately steep. Other than slope, they have few limitations for many nonfarm uses. The small areas of Westland soils are very poorly drained and have a seasonal high water table.

This association is a prime source of sand and gravel for construction. Practically all of the soils are underlain by thick deposits of sand and gravel.

8. *Westland-Montgomery association*

Deep, nearly level to depressional, very poorly drained soils that have a dominantly moderately fine textured and fine textured subsoil; formed in loamy outwash and clayey lacustrine material

This association occupies the level and depressional areas of undulating terraces. (See figure 8.)

This association makes up less than 1 percent of the county. About 50 percent of this is Westland soils, 40 percent is Montgomery soils, and the remaining 10 percent is other soils.

The Westland soils are deep and very poorly drained. They have a dark-colored surface layer and are underlain by calcareous sand and gravel. The Montgomery soils are deep and very poorly drained. They have a dark-colored surface layer and a clayey subsoil that is underlain by clayey sediments of old lake bottoms.

Among the other soils in this association are Carlisle muck and the very poorly drained Sloan soils.

Much of this soil association is used for farming. The main use is for growing grain to be used to feed dairy and beef cattle.

The major soils in this association are seasonally wet. Farming is delayed in spring unless the soils are arti-

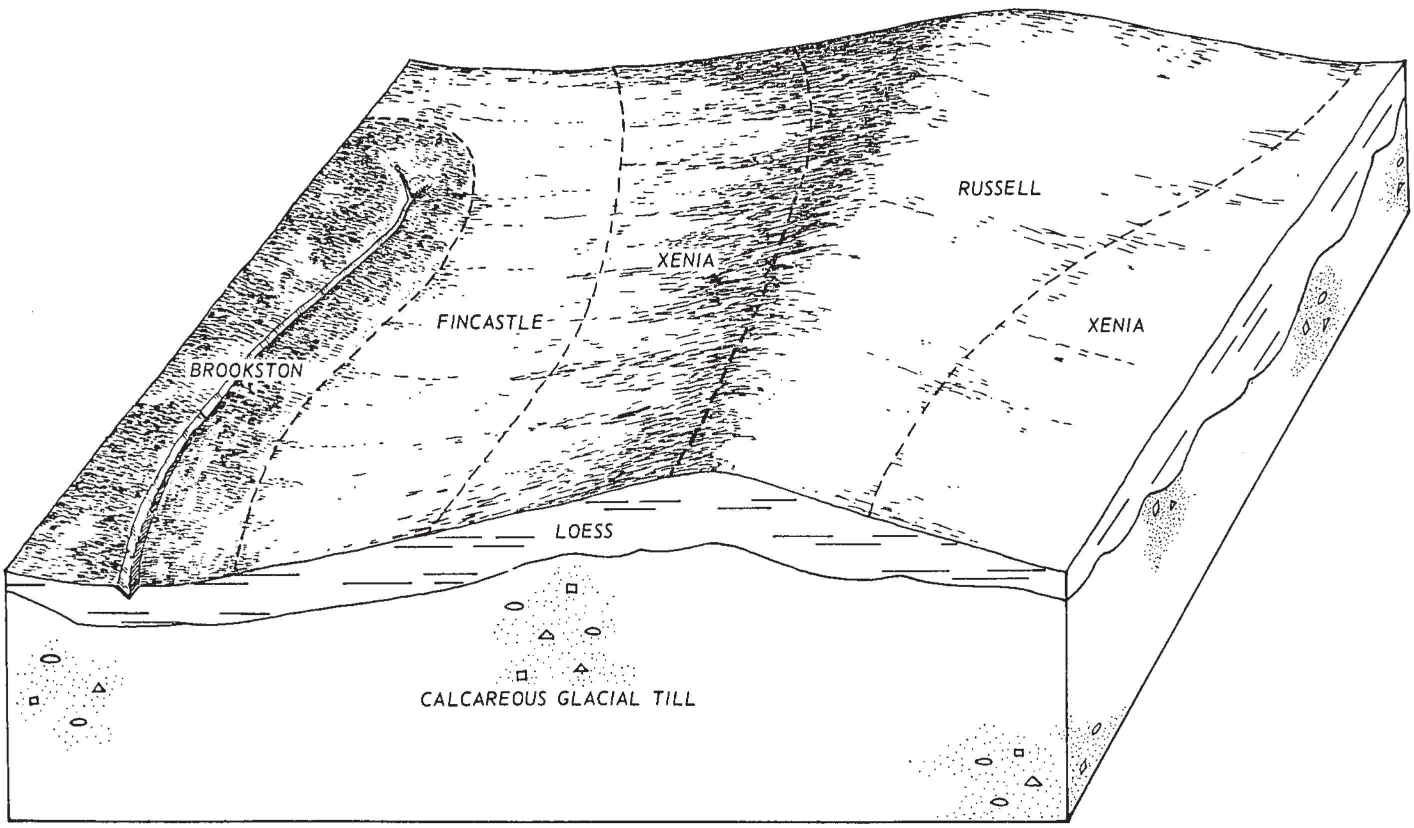

Figure 6.—Typical pattern of soils and underlying material in association 5.

ficially drained. The seasonally high water table is a limitation for many uses other than farming.

9. Ross-Medway association

Deep, nearly level, well drained and moderately well drained soils that have a dominantly moderately coarse textured and medium textured subsoil or underlying material; formed in loamy alluvium

This association occupies the nearly level flood plains along most of the streams in the county. (See figure 8.)

This association makes up 8 percent of the county. About 60 percent of this is Ross soils, 15 percent is Medway soils, and the remaining 25 percent is other soils.

Ross and Medway soils are deep, loamy, and dark colored.

Among the other soils in this association are the well-drained Landes and Lanier soils that are moderately deep or shallow over gravel, the somewhat poorly drained Shoals soils, and the very poorly drained Sloan soils.

Most of the acreage in this association is farmed. Most farms are of the cash-grain type, and there is some dairying and raising of beef cattle and hogs. In the city of Dayton, much of this association has been developed for business and industry.

These soils are subject to periodic stream overflow. Most flooding occurs in winter and early in spring and normally does not interfere with summer crops. Flooding, however, is a serious limitation for most nonfarm uses of these soils.

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Use and Management of the Soils

This section contains information about the management of the soils for crops and pasture, for woodland, for wildlife, for selected engineering uses, and for land-use planning. Estimated yields of the principal crops grown in the county are also given.

Management of Crops and Pasture

In this subsection general practices of management are discussed, the system of capability classification and the capability units are described, and a table listing estimated yields of principal crops grown under two levels of management is given.

The field crops commonly grown in Montgomery County include corn, soybeans, and wheat, oats, and other small grain. Plants suitable for pasture and hay include alfalfa, alsike clover, Ladino clover, red clover, timothy, orchardgrass, and bromegrass. Special crops commonly grown are tobacco, tomatoes, sweet corn, strawberries, cucumbers, cabbage, and other crops that are suited to the climate. The kinds of crops named are not exclusive, but they are given to serve as indicators of the kinds of crops that are suited to the soils and climate of the county.

General management practices of crops

Although the soils in Montgomery County vary in their suitability for specific crops and require widely

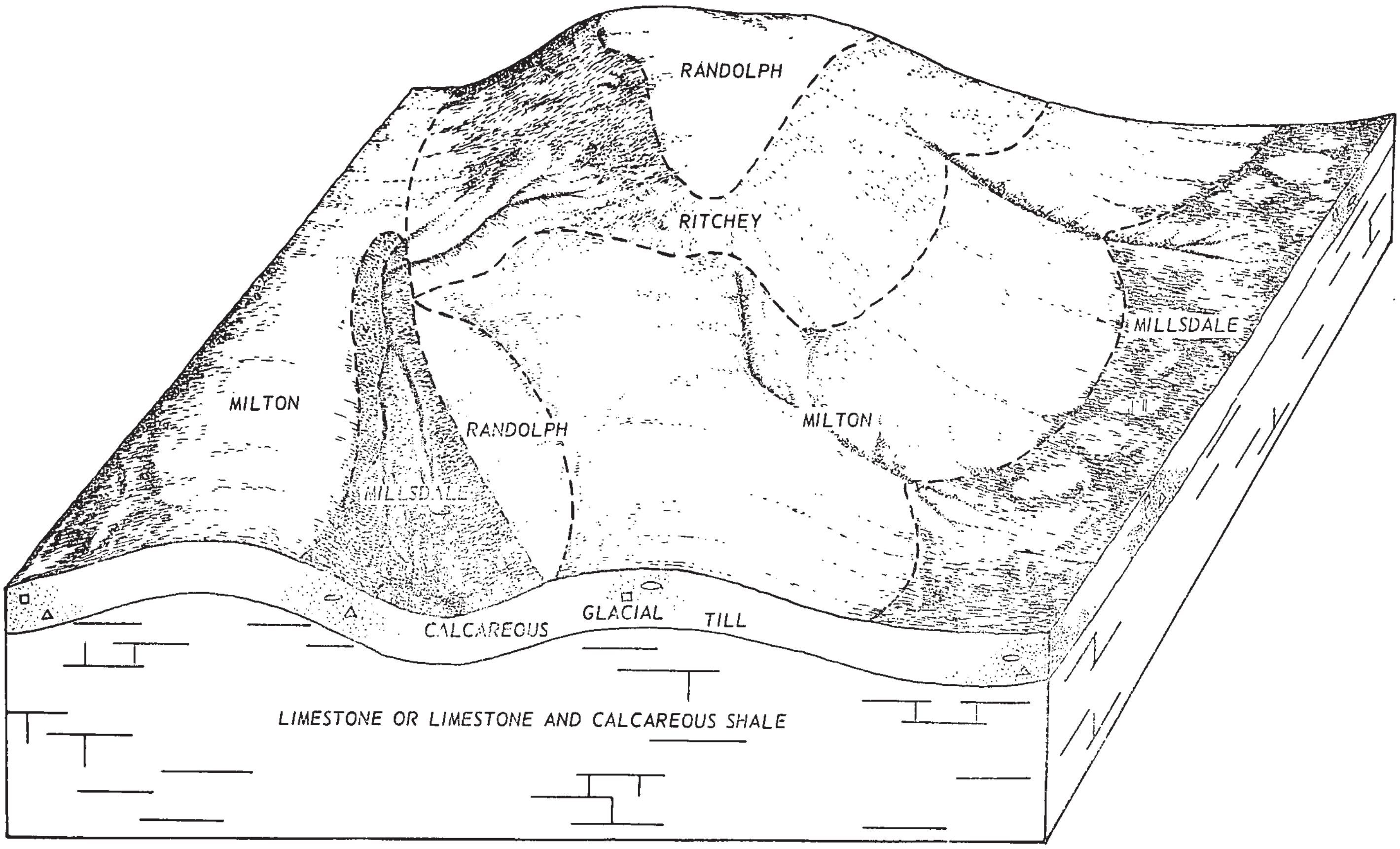

Figure 7.—Typical pattern of soils and underlying material in association 6.

different management, some basic, or general, management practices are needed on practically all of the soils. This subsection discusses the basic practices used for maintaining soil fertility, utilizing crop residue, improving drainage, and controlling erosion. Also, suitable cropping systems are discussed. The management of specified groups of soils is discussed in the subsection "Management by Capability Units," but more specific information can be obtained by consulting a representative of the Soil Conservation Service or the Ohio Cooperative Extension Service.

Maintenance of adequate levels of fertility.—Because many of the soils in this county, particularly the light-colored ones, are naturally acid and medium to low in content of plant nutrients, additions of lime and fertilizer are needed. Such additions should be based on the results of soil tests, on the need of the crop, and on the crop growth desired. Maintaining the organic-matter content of soils helps to insure good soil structure and tilth. For assistance in determining the kinds and amounts of fertilizer and lime to apply, farmers should consult the Ohio Cooperative Extension Service.

Use of crop residue.—Many of the soils in this county, particularly the light-colored ones, are not naturally high in organic-matter content. To offset this deficiency, all crop residue should be returned to the soil. If soybeans or other crops that produce little residue are grown, the cropping system should include cover crops and sod crops.

Drainage.—About 28 percent of the county contains soils that are limited in their suitability for farm crops by wetness. These soils have a seasonal high water table and are periodically flooded. Some areas of the clayey, very poorly drained soils are subject to ponding. Most of the seasonally wet soils on the uplands have a moderately slowly permeable or slowly permeable substratum. Because of the substratum, the soils are saturated in the upper 2 to 3 feet during winter and spring. Tile can be used in most of the wet soils if the substratum of dense, compact till is at sufficient depth to permit proper drainage. Tile does not function well in the somewhat poorly drained Pyrmont soils, because the dense till is close to the surface. On all of the somewhat poorly drained soils, crops respond well to artificial drainage. The Brookston, Montgomery, Westland, and most of the other very poorly drained soils are well suited to crops if the soils are properly drained. Tile, open ditches, and land smoothing are most commonly used to achieve drainage. A combination of some of these practices may be needed in some areas. Artificial drainage is not commonly needed on the Celina or other moderately well drained soils.

Control of erosion.—Many of the soils in this county have a surface layer that is fairly high in silt content and low in organic-matter content. Such a surface layer is highly susceptible to erosion by running water. The soils in about 16 percent of the county are moderately eroded, and in about 4 percent are severely eroded. Exclusive of

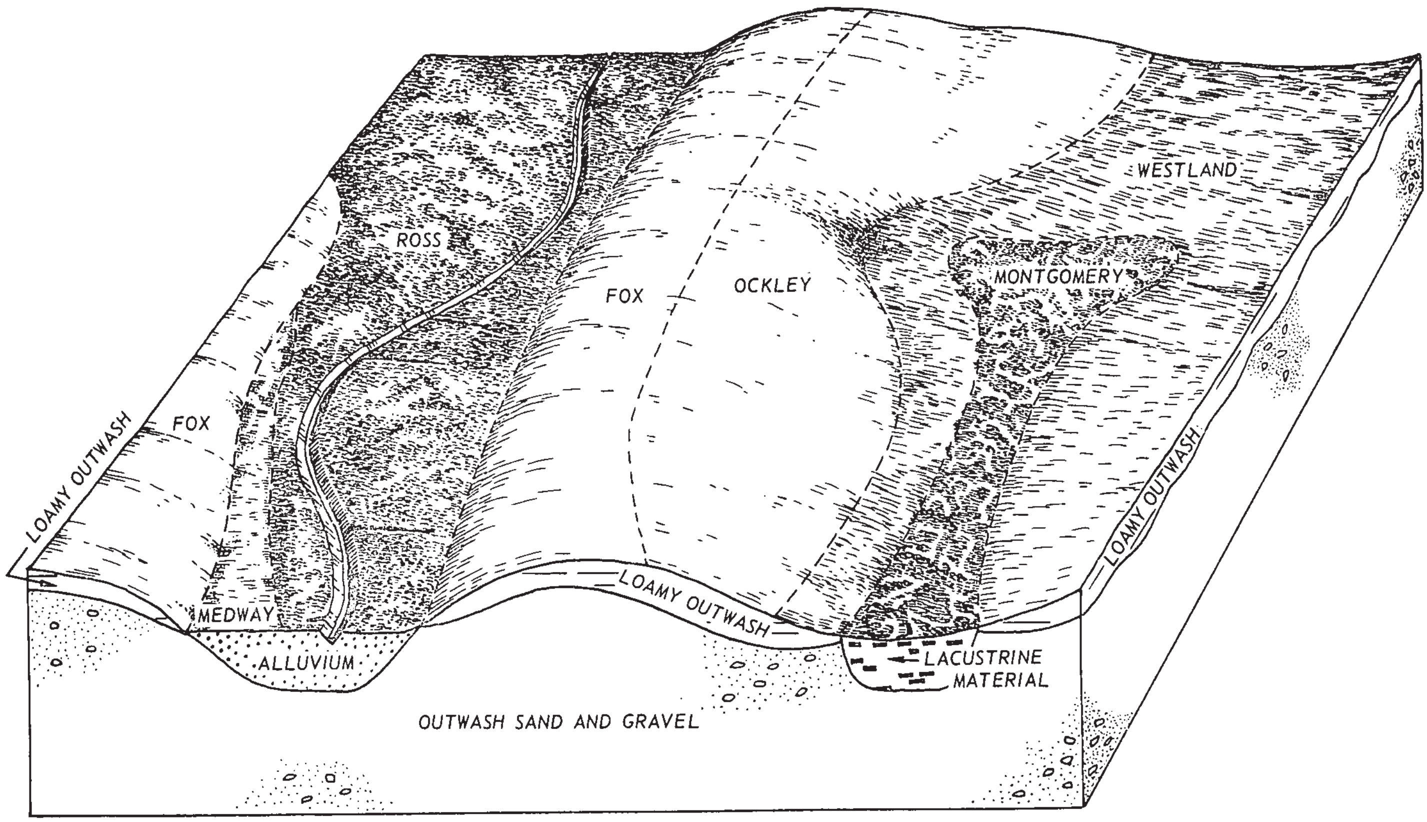

Figure 8.—**Typical pattern of soils and underlying material in associations 7, 8, and 9.**

sloping Urban land, about one-half of the acreage that is susceptible to erosion is eroded. Erosion control practices commonly used include terrace and waterway systems, diversion terraces, stripcropping on the contour, contour tillage, minimum tillage, use of crop residue, and maintenance of close-growing crops for protective cover.

Irrigation.—Irrigation is a specialized practice that requires very intensive management. Many soils in this county that are suited to crops are also suited to irrigation. Generally, soils well suited to irrigation absorb water readily, have adequate available moisture capacity, and drain readily. Among those considered suitable for irrigation are the nearly level and gently sloping Fox, Landes, Lanier, Lorenzo, Medway, Ockley, Ross, Thackery, Tippecanoe, Warsaw, and Wea soils. In addition, the Milton, Randolph, Ritchey, and Wynn soils tend to be droughty and thus crops grown on them are likely to produce more if they are irrigated.

Industries that need to dispose of waste water may be able to dispose of it through irrigation. Industrial wastes diverted to a natural stream can pollute the stream. Where no outlet for industrial wastes is available except through a stream, the pollutants should be eliminated before waste water is delivered to the stream. Industries that irrigate with water containing waste products need carefully to select the site for disposing of this waste to prevent contamination of the underground water supply. Some soils are not deep enough to assure adequate filtration.

Cropping systems.—A cropping system can be defined as growing crops and applying needed cultural and management measures. Cropping systems include the use of rotations that contain grasses and legumes, as well as sequences in which the desired benefits are achieved without the use of such crops.

A satisfactory cropping system meets the needs of the soils for improvement or maintenance of good physical condition; protects the soil during critical periods when erosion usually occurs; aids in the control of weeds, insects, and diseases; and fulfills the needs and desires of the farmer.

As the intensity of row crops in the cropping system is increased, the need for the establishment of conservation measures increases accordingly.

It is impractical to list all of the possible cropping systems for any particular soil. For example, if contour stripcropping is used on sloping soils, a satisfactory system is a 4-year rotation of a row crop, a small grain, and 2 years of meadow. If the contour strips were not established, the row crop might not be satisfactory in the cropping system, because erosion is excessive.

Pasture management

Most of the pasture in the county is on soils on which erosion is a hazard. These soils are generally eroded, are generally low in natural fertility, and commonly have poor tilth. Some pasture is on soils that need artificial drainage. Soils that require artificial drainage for optimum growth of row crops also require drainage for

optimum growth of pasture. The following general management suggestions apply to all or most of the soils in the county.

Erosion control.—This is particularly important because many of the soils used for pasture are already eroded. Control of erosion is particularly important during seeding. Mulch seeding or use of a nurse crop can help to control further erosion.

Drainage.—Drainage, if needed, must be as well established artificially as it is for row crops.

Lime and fertilizer.—The need for lime and fertilizer should be determined by soil tests, and adequate amounts should be supplied to meet the requirements of the pasture plants grown and the needs of the farmer.

Compaction.—Soil compaction, caused by grazing when the soils are wet, results in decreased growth of pasture. Harvesting methods, such as those for hay, silage, or soilage, help to increase plant growth and reduce soil compaction. Tillage at the optimum moisture content also helps to reduce soil compaction.

Other management practices.—The ability of a pasture to produce and to provide surface protection to the soils is influenced by the number of livestock, the length of time they graze, the season they graze, and the availability of water. Practices that contribute to good pasture management are use of stocking rates that maintain key forage species, pasture rotation and deferred grazing, grazing at the proper season, and supplying ample water strategically located.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering.

In the capability system, all kinds of soils are grouped at three levels: the capability class, the subclass, and the unit. These are discussed in the following paragraphs.

Capability Classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture or range, woodland, or wildlife habitat. (No class V soils mapped in Montgomery County.)

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife habitat.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife habitat.

Class VIII soils and landforms have limitations that preclude their use for commercial crop production and restrict their use to recreation, wildlife habitat, or water supply, or to esthetic purposes. (No class VIII soils mapped in Montgomery County.)

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in some parts of the United States but not in Montgomery County, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture or range, woodland, wildlife habitat, or recreation.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-2 or IIIe-3. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

The soils in Montgomery County have been placed in capability units. The soils in each unit have about the same limitations, are subject to similar risks of damage, need about the same kind of management, and respond to management in about the same way. In the following pages, each capability unit is described and management

of the soils in each unit is discussed. The mention of the soil series in the description of each capability unit does not mean that all the soils of the series mapped in this county are in the unit. To determine the individual soils in a capability unit, refer to the "Guide to Mapping Units" at the back of this survey.

In the discussions of the capability units, improved and optimum levels of management are mentioned for cropland and pasture. These levels of management are defined in the subsection "Estimated Yields."

The depth of the root zone refers to the depth of the soil to a high water table or bedrock, or to a layer of dense clay, compact till, or other material that restricts the growth of roots. The reference to soil reaction indicates the most acid condition that can be expected in the root zone.

The descriptions of the capability units also point out soil features that limit the use of the soils for crops or pasture. Only general recommendations for overcoming the limitations are given. Erosion control or drainage, for example, can be achieved by many methods or combinations of practices in any given field of any kind of soil. For specific information regarding erosion control, artificial drainage, selecting crop varieties, or other management practices, the reader should contact the nearest office of the Soil Conservation Service or the Ohio Cooperative Extension Service.

CAPABILITY UNIT I-1

This unit consists of soils of the Celina, Kendallville, Miamian, Ockley, Thackery, and Xenia series. These are nearly level, moderately well drained and well drained soils on terraces or uplands. The root zone of these soils is moderately deep to deep, permeability is moderate or moderately slow, the available moisture capacity is medium to high, and the capacity for storing and releasing plant nutrients is moderate or high. These soils are strongly acid or medium acid within the uppermost 18 inches of the root zone. The Ockley and Thackery soils have a calcareous, sandy and gravelly substratum at a depth of 40 to 60 inches. The rest of the soils in this unit are underlain with calcareous glacial till at a depth of 24 to 40 inches.

There are no soil features that limit more than very slightly the use of these soils for field crops or pasture. The erosion hazard is little or none if either improved or optimum management is used. All of the soils have a loamy plow layer that is subject to crusting. Deterioration of soil structure can be minimized by maintaining the organic-matter content with a large amount of crop residue returned to the soil.

These soils are suited to all field crops and hay or pasture plants commonly grown in the county. They also are suited to most kinds of specialty crops grown in the county. They are suited to row crops grown year after year if management is optimum. All of the soils are suited to irrigation.

CAPABILITY UNIT I-2

This unit consists of soils of the Corwin, Tippecanoe, and Wea series. These are dark-colored, moderately well drained or well drained, level soils on stream terraces and uplands. They have a moderately deep or deep root zone, moderate or moderately slow permeability, high available moisture capacity, and a high capacity for storing and releasing plant nutrients. They are mostly medium acid to slightly acid in the uppermost 18 inches of the root zone. The organic-matter content of their surface layer is high, and tilth generally is better than for similar lighter colored soils.

No significant soil features limit the use of these soils for field crops or forage plants. The erosion hazard is little or none if management is either optimum or improved. Deterioration of soil structure can be minimized by maintaining the organic-matter content with a large amount of crop residue returned to the soil. These soils are less susceptible to detrimental surface crusting than are similar light-colored soils.

The soils in this unit are suited to all field crops and forage plants commonly grown in the county. They also are suited to climatically adapted specialty crops. These soils are suited to row crops grown year after year if management is optimum. They are well suited to irrigation.

CAPABILITY UNIT IIe-1

This capability unit consists of soils in the Ockley, Russell, and Xenia series. These soils are deep and moderately well drained or well drained. They are loamy soils that are gently sloping and occur on uplands or stream terraces. These soils have a deep root zone, moderate or moderately slow permeability, a high available moisture capacity, and a moderate to high capacity for storing and releasing plant nutrients. They are strongly acid to medium acid in the upper part of the root zone. The organic-matter content of their surface layer is low to medium. Tilth is fair to good, but surface crusting is common. The Ockley soils have a calcareous gravelly and sandy substratum at a depth of 40 inches or more. The Russell and Xenia soils are underlain with loamy glacial till. The Ockley soils dry out more quickly than the other soils because they have better internal drainage.

A moderate hazard of erosion is the major limitation of these soils if they are used for cultivated crops. Surface runoff is moderate to rapid.

These soils are suited to all the field crops and forage plants commonly grown in the county. They also are suited to climatically adapted specialty crops if management is optimum. These soils are suited to continuous cultivation of row crops year after year on slopes up to 4 percent or to frequent cultivation on slopes of 4 to 6 percent if management is optimum. A large amount of crop residue returned to the soil helps to maintain the organic-matter content and tilth of these soils. These soils are suited to irrigation if erosion and surface runoff are controlled. They are very well suited to pasture or meadow if a thick plant cover is maintained.

CAPABILITY UNIT IIe-2

This unit consists of soils in the Fox and Warsaw series. These are well drained soils that are gently sloping and occupy stream terraces. They have a loamy plow layer and, except for the dark-colored Warsaw soil, are light colored. These soils have a root zone that is moderately deep over a calcareous sandy and gravelly substratum. They have moderate permeability, medium to low

available moisture capacity, and moderate capacity for storing and releasing plant nutrients. Fox sandy loam is more droughty and generally less productive than the other soils in this unit. The soils in this unit are strongly acid to medium acid in the upper part of the root zone.

A moderate hazard of erosion is the major limitation to use of these soils for cultivated crops. Drought is a moderate limitation to management. The sandy and gravelly substratum facilitates rapid internal drainage. This rapid internal drainage is beneficial in spring, but it causes crops to show the effects of drought during extended dry periods. Maintaining tilth generally is easy, but crusting is likely on Fox silt loam. These soils have a wide range of optimum moisture content for tillage.

The soils of this unit can be cropped frequently if management is optimum. Also, row crops can be grown year after year under optimum management, but erosion is harder to control where slopes are more than 4 percent. These soils are well suited to crops that mature early because field operations can begin earlier in spring than on most other soils. Early-maturing crops are also less likely to be damaged by drought. These soils are suited to all of the field crops and forage crops commonly grown in the county, and to climatically adapted specialty crops as well. They are well suited to irrigation.

CAPABILITY UNIT IIe-3

The soils in this unit are in the Celina, Lewisburg, Kendallville, and Miamian series. These are well drained to moderately well drained soils that have a loamy plow layer. They are gently sloping soils on uplands. Their root zone is mostly moderately deep. These soils have moderately slow permeability, medium available moisture capacity, and moderate capacity for storing and releasing plant nutrients. These soils are strongly acid to medium acid in the upper part of the root zone. Most of these soils overlie calcareous glacial till at a moderate depth, generally within 30 inches of the surface. The Lewisburg soils are shallow to glacial till and have a thinner favorable root zone than the other soils. Some of the soils in this unit are bouldery. The boulders must be removed for farming, but this requirement is not a severe limitation. In some places the bouldery soils have been used as a dumping ground for boulders removed from adjacent areas.

A moderate hazard of erosion is the major limitation of these soils if used for cultivated crops. Additional erosion on the moderately eroded Celina and Miamian soils may damage them severely. The soils in this unit are susceptible to surface crusting. They generally have low organic-matter content.

These soils are suited to all cultivated field crops and forage crops grown in the county. They can be cropped frequently if management is optimum. Management less than optimum is likely to result in excessive soil losses if row crops are grown frequently. Where slopes are less than 4 percent, these soils can be used for row crops year after year if management is optimum. The moderately eroded soils generally require more attention to management than the uneroded soils if crop growth is to be comparable. Tilth is generally less favorable on the moderately eroded soils, and content of naturally available plant nutrients is lower.

These soils have few limitations to use for pasture or meadow if a thick plant cover is maintained.

CAPABILITY UNIT IIe-4

Gently sloping soils in the Corwin, Dana, and Wea series are in this unit. These soils have a high organic-matter content, as indicated by their dark-colored surface layer. They are well drained or moderately well drained. The Corwin and Dana soils overlie calcareous glacial till, and the Wea soils overlie calcareous sand and gravel outwash. The root zone of all of these soils is moderately deep to deep, and the available moisture capacity is medium to high. These soils are easy to till, and their range of optimum moisture content for tillage is fairly wide. The moderately well drained soils dry slightly slower in spring than the well drained ones, but planting dates generally are not late.

A moderate erosion hazard is the major limitation of these soils if they are cultivated. Surface runoff is mostly medium, but it is rapid on the steeper slopes. These soils have a loamy, erodible surface layer.

The soils of this unit are suited to all cultivated field crops and forage plants commonly grown in the county. Specialty crops can be grown successfully if erosion is controlled. Row crops can be grown year after year if management is optimum. If row crops are grown continuously on slopes of more than 4 percent, excessive soil losses are common because erosion is harder to control on these slopes. In some included areas, erosion is moderate or nearly so. All of these soils are suited to irrigation, but the Wea soils are best suited. If a thick plant cover is maintained, these soils are well suited for pasture or meadow. These soils are well suited to improved pasture or meadow.

CAPABILITY UNIT IIe-5

This unit consists of soils in the Milton, Plattville, and Wynn series. These soils are moderately deep to limestone or limestone and shale and are well drained. The Milton and Wynn soils are light colored and generally low in organic-matter content. The Plattville soils are dark colored and relatively high in organic-matter content. The root zone of the soils in this unit is loamy to clayey, and its depth is limited by the underlying limestone. It is moderately deep in most places, but it becomes more shallow where limestone is nearest the surface. As a result, these soils have a medium to low available moisture capacity. Their plow layer is loamy and susceptible to crusting. The dark surface layer of the Plattville soil is relatively resistant to damaging surface crusting. These soils dry quickly in spring and are among the first soils in the county that can be worked. They have a moderate capacity to store and release plant nutrients. The root zone is medium acid in some places but is commonly slightly acid.

A moderate erosion hazard is the major limitation of these soils if they are cultivated. Surface runoff ranges from medium to rapid. The surface layer of the Milton and Wynn soils is very susceptible to erosion by running water. The surface layer of the Plattville soil is erodible, but less so than that of the other soils because it has a higher organic-matter content. Some of the soils in this

unit are moderately eroded and generally require a higher level of management.

The soils in this unit are suited to all cultivated field crops, specialty crops, and forage plants commonly grown in the county. Row crops can be grown year after year if management is optimum. Erosion losses are likely to be excessive on slopes of more than 4 percent if the soils are intensively farmed. If management is less than optimum, growing row crops continuously commonly results in excessive soil losses and less crop growth. In dry years these soils are better suited to small grain than to row crops. The soils tend to be droughty, particularly where the depth to bedrock is about 20 inches. These soils are suited to irrigation, but erosion is a hazard.

Limitations to use for pasture or meadow are few if a thick plant cover is maintained. Forage yields generally are low in summer and early in fall.

CAPABILITY UNIT IIw-1

The soils in this unit are in the Algiers and Shoals series. These soils have a loamy surface layer and are nearly level. They occupy flood plains and slightly convex alluvial fans at the base of valley walls. The light-colored surface layer of the Algiers soil is underlain by dark-colored, very poorly drained material at a depth of 12 to 30 inches. The Algiers and Shoals soils have a seasonal high water table and are subject to flooding. The zone favorable to root development is deep in summer when the water table is low. These soils have a high available moisture capacity and a moderate to high capacity for storing and releasing plant nutrients.

Seasonal fluctuations of the water table cause these soils to have a moderate wetness limitation, and they are subject to occasional flooding. The seasonal high water table can be lowered by tile drains if outlets can be established. Surface wetness is lessened by shallow ditches and by diversions at the base of adjacent valley slopes.

These soils can be continuously cultivated if optimum management is used. The hazard of erosion is little or none even if management is less than optimum, but optimum crop growth cannot be maintained for a long time. Where these soils are adequately drained, they are suited to most field crops and forage plants commonly grown in the county. They are soft when wet and slow to dry out in spring, and this limits their use for pasture in spring.

CAPABILITY UNIT IIw-2

This unit consists of Brookston and Westland soils that are dark colored and very poorly drained. The nearly level Westland soil occupies areas of stream terraces, and the nearly level Brookston soils occupy comparable positions on uplands. These soils have a seasonal high water table. Their root zone is deep when the water table is low. Permeability is moderate to moderately slow, the available moisture capacity is high, and the capacity for storing and releasing plant nutrients is very high. The root zone is mostly neutral. The organic-matter content of the surface layer is high, and tilth is fair to good. These soils have a fairly narrow range of optimum moisture content for tillage.

Seasonal wetness is the major limitation to use of these soils for crops. Maintaining good soil structure is difficult because these soils commonly are worked or grazed when wet. The resulting compaction and destruction of soil structure makes the soils more difficult to till and lessens the growth of pasture plants. The seasonal high water table can be lowered by tile drains. Surface wetness can be lessened by shallow ditches on either soil and by diversions at the bases of adjacent valley slopes on the Westland soils.

These soils can be continuously cultivated if management is optimum. They are suited to intensive use for commonly grown field crops and forage plants in areas that have been artificially drained. Areas not drained are chiefly wooded.

CAPABILITY UNIT IIw-3

This unit consists of soils in the Celina, Crosby, Fincastle, and Pyrmont series. These are somewhat poorly drained soils that are nearly level to gently sloping. The Crosby and Fincastle soils have a moderately deep root zone, moderately slow permeability, and a medium to high available moisture capacity. The Pyrmont soil has a shallow to moderately deep root zone, moderately slow to slow permeability, and low available moisture capacity. All of these soils have moderate capacity for storing and releasing plant nutrients. The organic-matter content of the surface layer is generally low, and tilth is only fair. These soils crust easily.

The soils in this unit are moderately limited by seasonal wetness. Most areas of Crosby and Fincastle soils can be improved by tile drainage. Tile is difficult to place where boulders occur in the topmost 4 feet of soil. Efforts to drain the Pyrmont soil with tile are largely unsuccessful because lateral percolation is slow through the compact till substratum. Surface drainage benefits all of the soils in this unit, particularly those that are nearly level. Erosion is a moderate hazard where these soils have slopes of 2 to 6 percent. The Pyrmont soil shows the most effects of summer drought.

All of these soils are suited to the commonly grown cultivated crops and forage plants. They are not well suited to specialty crops. If management is optimum, row crops can be grown year after year. Water-tolerant grasses and trees commonly grow in undrained areas. Because these soils are wet early in spring and in summer, they are susceptible to compaction if farm animals are permitted to graze during those periods.

CAPABILITY UNIT IIw-4

The soils in this unit are in the Landes, Lanier, Medway, and Ross series. These soils are dark colored and moderately well drained and well drained. They are nearly level and occupy flood plains along streams that overflow occasionally. The organic-matter content of the surface layer is moderate to high, and tilth is good. The root zone of these soils is deep or moderately deep. Permeability is moderate to rapid, the available moisture capacity is low to high, and the capacity for storing and releasing plant nutrients is moderate. A sandy and gravelly substratum occurs in the Medway and Ross soils at a depth of 40 inches or more. The Landes and Lanier soils are moderately coarse textured, relatively shallow to sand and gravel, and droughty.

Soil properties that restrict the use of these soils for field crops or pasture are few, but flooding limits the

choice of crops. Stream overflow occasionally damages winter grain late in winter. If improved or optimum management is used, there is no erosion hazard other than streambank erosion in a few places.

These soils are suited to all the field crops and hay or pasture plants commonly grown in the county. They also are suited to climatically adapted specialty crops. Continuous use for row crops is possible if management is optimum. These soils are well suited to irrigation.

CAPABILITY UNIT IIs-1

The soils in this unit are in the Fox, Milton, and Warsaw series. These are nearly level soils that are well drained and somewhat droughty. Their available moisture capacity is unfavorable because they are only moderately deep to either sand and gravel or fractured limestone bedrock. The root zone of these soils is moderately deep, the available moisture capacity is medium to low, and permeability is moderate to moderately slow. In most places these soils are medium acid in the root zone, but they are strongly acid in some places. They have moderate capacity for storing and releasing plant nutrients.

The major limitation of these soils for farming is a drought hazard. The degree of droughtiness depends on the local depth to sand and gravel or limestone. The hazard of erosion is little or none. The Fox and Milton soils are susceptible to surface crusting. The Warsaw soil has a higher organic-matter content than the other soils and therefore better tilth.

Crops that are harvested early grow well on these soils, but full-season crops can be injured by drought. These soils are well suited to irrigation, and if irrigation is available they are well suited to specialty crops. Pasture plants generally do not grow well late in summer, though forage crops can be grown if drought-resistant varieties are used.

CAPABILITY UNIT IIIe-1

The soils in this unit are in the Fox, Kendallville, Miamian, and Russell series. These soils are on uplands or terraces. They are well drained and either gently sloping and severely eroded or sloping and moderately eroded. These soils have a moderately deep to deep root zone and a medium available moisture capacity. The rooting depth and available moisture capacity are less in the Fox soils and the severely eroded Miamian soil than in the other soils. All of these soils have a moderate capacity for storing and releasing plant nutrients. They are moderately permeable or moderately slowly permeable and are strongly acid or medium acid in the upper part of the root zone. Miamian clay loam, 2 to 6 percent slopes, severely eroded, has the least favorable plow layer for tillage and seedling germination. In some places this soil is calcareous at the surface.

A severe erosion hazard is the major limitation of these soils if they are used for cultivated crops. Surface runoff is rapid. Maintenance of fertility, good soil structure, and organic-matter content are management concerns where these soils are frequently cultivated. The hazard of drought is moderate on the Fox soils and the severely eroded Miamian soil.

The soils in this unit are suited to all cultivated field crops and forage plants that are commonly grown in the county. They generally are not suited to specialty crops unless management is very intensive. They are suited to frequent cultivation if management is optimum. If management is less than optimum, erosion losses are likely to be excessive.

A thick plant cover on pastures and hay meadows helps to control erosion.

CAPABILITY UNIT IIIe-2

This unit consists of Milton and Plattville soils that are well drained and sloping. These soils have a loamy plow layer and a moderately deep root zone. They are underlain by limestone and calcareous shale bedrock at a depth of 20 to 40 inches. Permeability is moderately slow, the available moisture capacity is medium to low, and the capacity for storing and releasing plant nutrients is moderate. The dark-colored Plattville soil is less subject to damaging crusting than the lighter colored Milton soil.

A severe erosion hazard is the major limitation of these soils if they are cultivated. A drought hazard also exists where the depth to bedrock is at a minimum.

These soils are suited to all the field crops and forage plants that are common in the county. They generally are not suited to specialty crops unless management is very intensive. They are suited to frequent cultivation if management is optimum. Less than optimum management results in excessive erosion.

A thick plant cover on pastures and hay meadows helps to control erosion.

CAPABILITY UNIT IIIe-3

The soils in this unit are in the Ritchey series. These soils are well drained, gently sloping, and underlain by limestone and clay shale bedrock at a depth of 10 to 20 inches. They are moderately permeable, have a very low available moisture capacity, and have a moderate capacity for storing and releasing plant nutrients. They are medium acid to neutral.

A severe hazard of erosion is the major limitation to the use of these soils for cultivated crops. Because these soils are shallow to bedrock, drought also is a hazard.

These soils are suited to most of the field crops and forage plants commonly grown in the county. Drought-resistant varities should be used where possible. Growing specialty crops on these soils is extremely risky unless management is very intensive. These soils are suited to relatively frequent cultivation if management is optimum. Erosion losses year after year quickly cause these soils to become poorly suited to cultivated crops. Pasture plants grow slowly on these soils in midsummer. A thick plant cover helps to control erosion in hay meadows and pastures.

CAPABILITY UNIT IIIw-1

The soils in this unit are in the Montgomery and Sloan series. These are dark-colored, very poorly drained soils that are nearly level and occur on bottom lands, terraces, and uplands. They have a deep root zone when the water table is low and a high capacity to store and release plant nutrients. The Montgomery soil has a clayey subsoil, is slowly permeable, and has a high available moisture capacity. The Sloan soil is less clayey and has moderately slow permeability and a high available moisture capacity. Both soils are slightly acid to neutral in the root zone.

Wetness is the major limitation to the use of the soils in this unit. These soils have a seasonal high water table. Ponding is a hazard on the Montgomery soil, and stream flooding is a hazard on the Sloan soil. Maintenance of good soil structure is also a management concern because these soils are commonly worked when wet. If they are worked or grazed when wet, the resulting compaction and destruction of soil structure make the soils more difficult to till. The seasonal high water table can be lowered by tile drains if outlets can be established. Surface wetness can be lessened by shallow ditches and by diversions at the base of adjacent slopes.

These soils can be used for continuous row crops if management is optimum. If they are adequately drained, they are suited to most of the field crops and forage plants commonly grown in the county. Damage to winter grains by flooding or ponding is a hazard.

CAPABILITY UNIT IIIw-2

Randolph silt loam, 0 to 2 percent slopes, is the only soil in this unit. This is a nearly level, somewhat poorly drained soil that has a root zone moderately deep over limestone bedrock. Permeability is moderately slow, the available moisture capacity is medium, and the capacity for storing and releasing plant nutrients is moderate. In some places this soil is strongly acid in the upper part of the root zone. It is typically medium acid.

A severe hazard of seasonal wetness is the major limitation of this soil if it is used for cultivated crops. Limestone bedrock at a depth of 20 to 40 inches makes installation of tile difficult. Surface drainage and land smoothing are beneficial in many places.

If this soil is adequately drained, it is suited to most of the field crops and forage plants grown in the county. It can be used for row crops year after year if management is optimum. Undrained areas are generally too wet for small grains, and planting dates for summer crops are late because this soil is slow to dry in spring.

CAPABILITY UNIT IIIw-3

Millsdale silty clay loam, 0 to 3 percent slopes, is the only soil in this unit. This is a very poorly drained, dark-colored soil that is moderately clayey and has a moderately deep root zone. Limestone and clay shale bedrock is at a depth of 20 to 40 inches. Permeability is moderately slow, and the available moisture capacity is medium. This soil is mostly neutral, but it is medium acid in places. The surface layer is high in organic-matter content.

Seasonal wetness is a severe limitation on this soil. Tile installation is made difficult by the underlying bedrock. Erosion is a secondary limitation in some areas where slopes are long and gentle. This soil is commonly tilled when too wet because its range of optimum moisture content for tillage is so narrow.

This soil, if artificially drained, is suited to most of the field crops and forage plants commonly grown in the county. Row crops can be grown year after year if management is optimum. Undrained areas are generally too wet for farming. They are used for pasture.

CAPABILITY UNIT IIIw-4

The only soil in this unit is Carlisle muck. This soil is level to depressional, very poorly drained, dark colored, and organic. It has a deep root zone when the water table is low, moderately rapid permeability within the muck, a high available moisture capacity, and a very high capacity for storing and releasing plant nutrients. The muck is more than 50 inches thick. Reaction is neutral.

Excessive wetness is the major limitation of this soil. The water table is normally high for most of the year. The control of excess water includes diverting runoff from higher areas and artificial drainage. Tile drainage is difficult to maintain because the muck is compressible if it is used as a base for alining the tile. If this soil is drained, soil blowing is a severe hazard and the dry muck is subject to fire damage. Prolonged drainage results in oxidation and subsidence of the muck. Although this soil is high in organic-matter content, the plant nutrient content is low except for nitrogen.

If drained, this soil is suited to specialty crops and general field crops. It is one of the best soils in the county for vegetables if very intensive management is used. Weed control is more difficult on this soil than on most mineral soils.

CAPABILITY UNIT IVe-1

The soils in this unit are in the Fox, Miamian, and Russell series. These are well-drained soils on terraces and uplands. Some of these soils are sloping and severely eroded, and the others are moderately steep and moderately eroded. The severely eroded soils have a shallow to moderately deep root zone and a low to medium available moisture capacity. The moderately eroded soils have a moderately deep root zone that is medium in available moisture capacity. The soils of this unit are moderately permeable or moderately slowly permeable. The Fox soils have calcareous sand and gravel at a depth of 24 to 42 inches. The other soils are underlain with calcareous till. These soils are strongly acid or medium acid in the root zone.

A very severe hazard of erosion is the major limitation to the use of these soils for cultivated crops. Organic-matter content is low, and tilth is generally poor. Surface runoff from these soils is rapid. Both of the Fox soils and the other severely eroded soils have an additional management concern of droughtiness. The severely eroded soils are commonly calcareous to the surface.

These soils are suited to occasional cultivation if management is optimum. They are better suited to grasses and legumes or to small grain than to row crops. A small grain can be used as a companion crop when pasture or meadow is reseeded. Helpful in controlling erosion are trash mulch seedings and, in pasture, a thick plant cover.

CAPABILITY UNIT IVe-2

The soils in this unit are in the Lorenzo, Ritchey, and Rodman series. These soils are shallow over sand and gravel or limestone and are sloping to moderately steep. They are well drained, very low in available moisture capacity, and medium acid to neutral. They have a shallow root zone. Ritchey soils are moderately permeable and have a moderate capacity for storing and releasing plant nutrients. The Lorenzo and Rodman soils are loamy, have rapid permeability, and have a low capacity for storing and releasing plant nutrients.

A severe hazard of erosion is the major limitation to use of these soils for cultivated crops. An additional management concern is droughtiness.

These soils are suited to occasional cultivation if management is optimum. They are better suited to small grains than to row crops.

A small grain can be used as a companion crop where pasture or meadow is reseeded. Because these soils are shallow and low in available moisture capacity, pasture plants grown on them are not dependable late in summer and in fall and can be easily overgrazed. Overgrazing may result in continuing erosion.

CAPABILITY UNIT IVe-3

Only sloping and moderately steep Milton soils are in this unit. These soils are moderately deep over limestone and clay shale bedrock. They are well drained and moderately slowly permeable. They have a medium to low available moisture capacity and a moderate capacity for storing and releasing plant nutrients.

A severe erosion hazard is the major limitation to use of these soils for cultivated crops. Organic-matter content is low, especially in the severely eroded soils, and tilth is poor. These soils are droughty.

These soils are suited to an occasional row crop or to forage plants grown for pasture or hay. They are better suited to small grain or forage crops than to row crops. Small grain crops or trash mulch seedings help to control erosion when forage crops are reseeded.

CAPABILITY UNIT VIe-1

Only the Lorenzo-Rodman complex, 12 to 18 percent slopes, moderately eroded, is in this unit. The soils in this complex are well drained and shallow or very shallow to the coarse sand and gravel substratum. They have a high organic-matter content, a very low available moisture capacity, and a low capacity to store and release plant nutrients. These soils are neutral to mildly alkaline.

The major limitation of these soils is a severe hazard of erosion. Because these soils are moderately steep, surface runoff is rapid. They are among the droughtiest soils in Montgomery County.

These soils are too steep, erodible, and droughty to be used for cultivated crops. They are suited to pasture, but improved pasture is not dependable for use in summer and fall. Care should be taken to prevent overgrazing, because a loss of plant cover increases the erosion hazard.

CAPABILITY UNIT VIe-2

The soils of this unit are in the Fairmount and Ritchey series. These soils are shallow over limestone and clay shale bedrock. They are moderately steep to very steep. These soils are well drained and have moderate or moderately slow permeability, a low available moisture capacity, and a moderate capacity for storing and releasing plant nutrients.

The hazard of erosion is severe, and these soils are droughty. All of these soils are moderately eroded. Their organic-matter content is low. Steep slopes make the use of modern farm machinery hazardous in some areas. In places slopes are fairly long and surface runoff is very rapid.

These soils are suited to use for pasture. They are poorly suited to cultivated crops. In most areas improved pasture is more desirable than native pasture. Pastures are not dependable for grazing in summer or fall, because of droughtiness. Care should be taken to prevent overgrazing and subsequent loss of plant cover, because erosion is likely to increase in overgrazed areas.

CAPABILITY UNIT VIe-3

The soils in this unit are in the Hennepin and Miamian series. These soils are shallow to moderately deep over glacial till and are moderately steep to very steep. They are well drained. The Hennepin soil is moderately slowly permeable and has a medium available moisture capacity. The severely eroded Miamian soil is moderately slowly permeable and has a low to very low available moisture capacity and, in some places, is calcareous at the surface.

A severe erosion hazard is the major limitation to use of these soils. The severely eroded soils tend to be droughty, but they are less droughty than the other soils in the VIe subclass.

The soils in this unit are too thin and steep for cultivated crops, but they are suitable for pasture. The pastures on these soils can be improved. Pastures are not dependable for grazing in summer or fall on soils with low and very low available moisture capacity. Care should be taken to prevent overgrazing and the loss of plant cover that is needed to control erosion.

CAPABILITY UNIT VIIe-1

This capability unit consists of moderately eroded and severely eroded Hennepin and Miamian soils that are steep or very steep. These soils have a shallow or very shallow root zone and a low to very low available moisture capacity. The capacity to store and release plant nutrients is low. In some severely eroded areas, calcareous till is at the surface. Some of these areas are badly gullied.

The major limitation of these soils is the very severe hazard of further erosion. Droughtiness is an additional management concern.

The soils in this unit are suited to limited grazing. They are better suited to native grasses than to improved pasture. In areas between gullies, favorable soil material is slightly thicker than in the gullies and plant cover such as grass or trees can be established more easily. Overgrazing should be prevented to help conserve plant cover and to help control erosion.

CAPABILITY UNIT VIIe-2

Moderately eroded Rodman and Fox soils that are steep or very steep make up this unit. Eroded areas of these soils become increasingly gravelly as erosion continues. These soils have moderate to rapid permeability and are well drained. They occupy terrace escarpments. The soils are mostly shallow and have low or very low available moisture capacity. On most of the terrace escarpments, slopes are short and difficult to protect from erosion.

The hazard of further erosion is the major limitation to use of these soils. The steep slopes and droughtiness are additional management concerns.

These soils are suited to trees, wildlife habitat, and native pasture where grazing is limited. A permanent plant cover helps to prevent further erosion.

Estimated yields

Table 1 shows, for most of the soils in the county, the estimated average acre yields of the principal crops. These yields are for two levels of management and are the averages expected over a period of several years. Some of the soils are not listed, because they are not suited to the crops rated. Also excluded are Borrow pits, Gravel pits, Made land, Quarries, Riverwash, and the soil complexes of which Urban land is a part.

In table 1, yields in columns A are obtained under improved management and those in columns B are obtained under optimum management. Under an optimum level of management—

1. Practices are used that increase the intake of water and the available moisture capacity of the soils. Excess water is disposed of by appropriate means.
2. Practices are used that help to control erosion.
3. Suitable methods of plowing, preparing the seedbed, and cultivation are used.
4. Weeds, diseases, and insects are controlled.
5. Fertility is maintained at the highest practical level. Lime and fertilizer are applied according to the needs of the soil and crop. The fertilizer contains trace elements (zinc, cobalt, manganese, copper, and the like) if they are needed.
6. Crop varieties that are suited to the soil are selected.
7. All farming operations are done at the proper time and in a proper way.

Under an improved level of management the farmer uses some, but not all, of the practices listed under optimum management, or the practices used are not adequate for the needs of the crops.

The estimates of yields given in table 1 do not apply to a specific field for any particular year, because the soils vary from place to place, management practices vary from farm to farm, and the weather varies from year to year.

The estimates of yields in table 1 are intended only as a guide to show the relative productivity of the soils, the response of the soils to management, and the relationship of the soils to each other. Although the general level of crop yields may change as new methods and new crop varieties are developed, the relationship of the soils to each other is not likely to change.

Pasture yields in cow-acre-days are not given in table 1. These yields, however, can be determined by multiplying the tons of alfalfa-grass hay by 2,000 to convert tons to pounds and then by dividing the number of pounds by 40 to determine cow-acre-days. For example, Sloan silt loam yields 5 tons of alfalfa-grass hay per acre under optimum management; 5 times 2,000 equals 10,000, and that divided by 40 equals 250, which is the estimated average number of days per year that one cow can graze an acre of Sloan silt loam without damage to the pasture.

The estimates of yields given in table 1 are based primarily on information obtained from farmers and on observations and field trials made by the county agent and district conservationists of the Soil Conservation

TABLE 1.—*Estimated yields per acre of principal crops under two levels of management*

[Figures in columns A indicate yields under improved management; figures in columns B indicate yields under optimum management. Absence of figure indicates that the crop is not commonly grown under the management level indicated. No estimates are given for complexes of which Urban land is a part, for miscellaneous land types, and for some soils that are too steep or eroded to be used for the crops listed]

Soil	Corn		Wheat		Oats		Soybeans		Alfalfa-grass hay	
	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*
Algiers silt loam	75	125	35	45	60	80	25	40	2.6	4.5
Brookston silt loam	80	115	30	45	50	80	28	40	3.0	4.5
Brookston silt loam, overwash	80	115	30	45	50	80	28	40	3.0	4.5
Brookston silty clay loam	80	125	30	45	46	73	28	45	3.5	5.0
Carlisle muck	75	125								
Celina silt loam, 0 to 2 percent slopes	75	115	35	45	60	80	30	40	3.5	5.0
Celina silt loam, 2 to 6 percent slopes	75	110	30	45	45	70	30	40	2.6	5.0
Celina silt loam, 2 to 6 percent slopes, moderately eroded	60	100	25	40	45	70	25	35	2.4	4.0
Celina bouldery silt loam, 2 to 6 percent slopes [1]	60	100	25	40	45	70	24	33	2.5	3.5
Corwin silt loam, 0 to 2 percent slopes	75	100	26	40	46	72	27	35	3.0	4.5
Corwin silt loam, 2 to 6 percent slopes	70	120	35	45	60	80	30	40	3.0	5.0
Crosby silt loam, 0 to 2 percent slopes	65	110	25	40	42	70	30	40	3.0	5.0
Crosby-Celina silt loams, 2 to 6 percent slopes	51	115	30	40	50	75	30	40	3.0	5.0
Dana silt loam, 2 to 6 percent slopes	75	110	30	44	47	73	28	40	3.0	4.5
Fairmount silty clay loam, 12 to 25 percent slopes, moderately eroded									2.0	3.5
Fairmount silty clay loam, 25 to 50 percent slopes, moderately eroded									1.5	2.0
Fincastle silt loam, 0 to 4 percent slopes	72	105	24	40	42	72	22	40	2.5	4.0
Fox sandy loam, 0 to 2 percent slopes	46	85	20	35	45	70	16	26	2.2	3.5
Fox sandy loam, 2 to 6 percent slopes	45	72	19	29	36	57	15	25	2.0	3.4
Fox loam, 0 to 2 percent slopes	65	90	25	40	48	76	22	30	3.0	4.5

See footnote at end of table.

TABLE 1.—*Estimated yields per acre of principal crops under two levels of management*—Continued

Soil	Corn		Wheat		Oats		Soybeans		Alfalfa-grass hay	
	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*
Fox loam, 2 to 6 percent slopes	65	90	24	40	46	70	20	28	3.0	4.5
Fox loam, 6 to 12 percent slopes, moderately eroded	41	77	20	35	36	58	16	25	2.5	4.0
Fox silt loam, 0 to 2 percent slopes	60	95	26	40	50	75	23	32	3.0	4.5
Fox silt loam, 2 to 6 percent slopes	57	95	25	40	49	75	22	32	3.0	4.5
Fox silt loam, 6 to 12 percent slopes, moderately eroded	48	80	22	33	40	68	18	25	2.5	4.0
Fox silt loam, 12 to 18 percent slopes, moderately eroded	40	70	16	22	30	55	15	21	1.8	3.0
Fox soils, 6 to 12 percent slopes, severely eroded	35	60	16	22	30	55	15	21	2.0	3.0
Hennepin and Miamian silt loams, 18 to 25 percent slopes, moderately eroded									1.3	2.5
Kendallville silt loam, 0 to 2 percent slopes	80	110	35	45	45	73	24	34	3.0	4.5
Kendallville silt loam, 2 to 6 percent slopes	80	110	35	45	45	73	24	34	3.0	4.5
Kendallville silt loam, 6 to 12 percent slopes, moderately eroded	75	105	36	40	50	65	25	35	2.5	4.0
Landes sandy loam	71	103	31	39	46	75	28	34	2.9	4.5
Lanier sandy loam	60	75	25	34	35	55	15	25	2.3	3.5
Lewisburg silt loam, 2 to 6 percent slopes	60	100	25	40	45	70	25	35	2.4	4.0
Lorenzo-Rodman complex, 4 to 12 percent slopes, moderately eroded	40	65	15	25	30	60	14	20	1.5	3.0
Lorenzo-Rodman complex, 12 to 18 percent slopes, moderately eroded									1.0	2.0
Medway silt loam	80	125	32	40	53	80	32	45	3.0	5.0
Miamian silt loam, 0 to 2 percent slopes	60	100	30	40	55	80	22	40	3.0	4.5
Miamian silt loam, 2 to 6 percent slopes	60	100	30	40	55	80	22	40	3.0	4.5
Miamian silt loam, 2 to 6 percent slopes, moderately eroded	55	90	28	36	50	75	20	28	2.5	4.2
Miamian silt loam, 6 to 12 percent slopes, moderately eroded	50	85	26	36	46	70	20	26	2.5	4.0
Miamian silt loam, 12 to 18 percent slopes, moderately eroded	35	75	17	26	28	45	12	20	1.5	2.8
Miamian bouldery silt loam, 2 to 6 percent slopes [1]	63	90	25	39	45	73	26	34	2.6	3.6
Miamian clay loam, 2 to 6 percent slopes, severely eroded	40	70	20	30	30	46	14	20	1.8	2.8
Miamian clay loam, 6 to 12 percent slopes, severely eroded	40	65	18	25	24	45	10	25	2.0	3.0
Miamian clay loam, 12 to 18 percent slopes, severely eroded					25	45			2.0	2.5
Millsdale silty clay loam, 0 to 3 percent slopes	64	105	30	45	55	80	24	40	2.7	4.2
Milton silt loam, 0 to 2 percent slopes	60	90	25	42	50	75	22	32	2.2	4.0
Milton silt loam, 2 to 6 percent slopes	60	85	24	40	50	75	22	30	2.0	4.0
Milton silt loam, 2 to 6 percent slopes, moderately eroded	40	80	22	35	45	65	15	25	2.0	3.5
Milton silt loam, 6 to 12 percent slopes, moderately eroded	35	75	22	34	31	60	15	25	1.4	2.6
Milton silt loam, 12 to 18 percent slopes, moderately eroded	30	60	18	30	30	45	10	18	1.2	2.0
Milton silty clay loam, 6 to 18 percent slopes, severely eroded	24	60	15	24	23	37	8	16	1.0	2.3
Montgomery silty clay loam	75	125	24	44	60	85	28	42	3.0	5.0
Ockley silt loam, 0 to 2 percent slopes	75	110	30	40	60	85	25	40	3.0	5.0
Ockley silt loam, 2 to 6 percent slopes	67	105	28	43	50	80	25	34	2.7	4.1
Plattville silt loam, 2 to 6 percent slopes	68	95	23	38	44	75	26	32	2.7	4.0
Plattville silt loam, 6 to 12 percent slopes	68	90	22	35	43	70	26	28	2.7	4.2
Pyrmont silt loam, 0 to 2 percent slopes	35	60	16	30	31	55	16	28	1.7	3.2
Randolph silt loam, 0 to 2 percent slopes	60	100	25	34	50	70	20	32	2.0	3.5
Ritchey silt loam, 2 to 6 percent slopes	40	65	18	30	35	62	16	22	1.7	3.2
Ritchey silt loam, 2 to 6 percent slopes, moderately eroded	40	60	18	30	30	60	14	20	1.5	3.0
Ritchey silt loam, 6 to 12 percent slopes, moderately eroded			18	28	30	55			1.2	2.5
Ritchey silt loam, 12 to 25 percent slopes, moderately eroded									1.2	2.0
Ritchey silt loam, 25 to 50 percent slopes, moderately eroded									1.0	1.8
Ritchey silty clay loam, 6 to 18 percent slopes, severely eroded			15	22	25	50			1.0	2.0
Ross silt loam	92	125	33	45	54	78	32	40	3.1	5.0
Russell silt loam, 2 to 6 percent slopes	69	100	26	42	48	74	28	36	2.7	4.5
Russell-Miamian silt loams, 6 to 12 percent slopes, moderately eroded	49	85	21	38	38	70	22	30	2.1	3.2
Russell-Miamian silt loams, 12 to 18 percent slopes, moderately eroded	40	75	18	27	29	46	13	21	1.8	3.1
Shoals silt loam	67	100	24	40	45	69	27	40	2.3	4.5
Sloan silt loam	75	110	30	45	42	70	30	45	2.7	5.0
Thackery silt loam, till substratum, 0 to 2 percent slopes	64	102	27	42	49	78	23	35	2.7	4.0
Tippecanoe silt loam, 0 to 2 percent slopes	85	117	30	39	52	76	30	39	3.0	4.5
Warsaw silt loam, 0 to 2 percent slopes	75	110	28	40	52	75	28	40	3.5	4.5
Warsaw silt loam, 2 to 6 percent slopes	74	108	27	40	51	74	27	40	2.7	4.5
Wea silt loam, 0 to 2 percent slopes	90	120	31	45	53	77	30	45	3.5	5.0
Wea silt loam, 2 to 6 percent slopes	89	115	30	39	52	70	29	32	3.0	4.5
Westland silty clay loam	80	125	24	40	46	75	28	38	3.0	5.0
Wynn silt loam, 2 to 6 percent slopes, moderately eroded	50	90	26	36	40	68	20	30	2.5	3.5
Xenia silt loam, 0 to 2 percent slopes	66	105	26	45	46	75	25	35	2.5	4.5
Xenia silt loam, 2 to 6 percent slopes	65	100	25	40	45	68	24	30	2.0	4.0

[1] The bouldery soils are rated on the basis of having boulders removed from the soil surface and the plow layer.

Service. They are also based on experiments made by the Ohio Agricultural Research and Development Center and on field observations made by members of the soil survey party.

Woodland Uses of the Soils

Nearly all of the county originally was covered by a forest of mixed hardwoods, but most of the forest has been cleared. The remaining woodland is on soils that are naturally wet and undrained and on other soils that are not farmed. Most of the wooded areas are small farm woodlots. In most woodlots, trees are of poor quality because of the past methods of harvesting whereby the best species of trees were harvested and inferior species were allowed to grow. With proper management, however, most woodland in the county will increase in value.

Table 2 gives, for six major soil series in the county, the site-index data from a few plots and average estimated yearly growth per acre for one or more important species of trees (*6*, *10*). The site index is a standard measurement of forest quality expressed as the height of a given species at a specified age, generally 50 years. The average estimated yearly growth per acre given in table 2 is for unmanaged stands.

The following paragraphs give information pertinent to the management of the soils in the series listed in table 2.

Celina, Fox, and Miamian soils.—These are soils on which the finest hardwoods grow well. The potential average growth per year is based on past performance of upland oaks in unmanaged stands and is expected to be slightly more than 300 board feet per acre per year over a span of 80 years. Erosion hazard, equipment limitations,

TABLE 2.—*Woodland site indexes and potential average yearly growth*

Soil series	Species of trees	Number of plots sampled	Estimated site index [1]	Potential average yearly growth per acre [2]
				Board feet
Brookston.	Swamp white oak.	2	80–90	(3)
Celina.	Red oak	1	75–85	309
	White oak	1	75–85	309
	Yellow-poplar	1	85–95	441
Crosby.	White oak	1	75–85	309
	Red oak	1	75–85	309
	Yellow-poplar	1	85–95	441
Fincastle.	Red oak	1	75–85	309
	Yellow-poplar	1	85–95	441
Fox.	Red oak	1	75–85	309
Miamian.	Red oak	1	75–85	309

[1] Site index is the total height in feet that the trees growing in an even-aged, well-stocked stand will attain at 50 years of age (*6*, *10*).

[2] The potential average yearly growth in board feet per acre from seedlings, over a span of 80 years (*6*, *10*).

[3] Not determined.

seedling mortality, and windthrow hazard are slight except on the steeper slopes. Plant competition is severe for conifer seedlings and moderate for hardwood seedlings and saplings.

Brookston and Crosby soils.—These soils are poorly drained and somewhat poorly drained and are nearly level to gently sloping. Upland oaks in unmanaged stands have been measured to yield more than 300 board feet per acre per year over a span of 80 years. Seedling mortality, windthrow hazard, equipment limitations, and plant competition are severe. The hazard of erosion is slight. Suitable species include red oak, white oak, black oak, yellow-poplar, white ash, sugar maple, black walnut, and red maple.

Fincastle soils.—These soils generally are somewhat poorly drained. Upland oaks in unmanaged stands have been measured to yield more than 300 board feet per acre per year. Equipment limitation, windthrow hazard, seedling mortality, and erosion hazard are moderate. Plant competition is severe.

For specific information about managing the soils of Montgomery County for woodland, the reader should contact the local district conservationist of the Soil Conservation Service or the local Cooperative Extension Office.

Use of the Soils for Wildlife

Wildlife is an important natural resource in Montgomery County. Since the early days of settlement, land has been cleared and the wildlife in the county has changed in kind, distribution, and number. Because of changes in land use, and the resulting changes in wildlife distribution, it is difficult to correlate the kinds and numbers of wildlife with specific soils.

All of the soils in the county have some potential for producing the elements of habitat necessary for wildlife survival. Table 3 rates the suitability of the soils in the county for eight selected elements of wildlife habitat and for open-land, woodland, and wetland wildlife (*1*).

The ratings used in table 3 are 1, 2, 3, and 4, each number representing relative suitability. A rating of 1 indicates well suited; 2, suited; 3, poorly suited; and 4, not suited. Soils that are *well suited* have few limitations, those that are *suited* have moderate limitations, and those that are *poorly suited* have severe limitations. Not considered in the ratings are present land use, the location of a soil in relation to other soils, and the mobility of wildlife. All of the soils are rated on the basis of their natural drainage class. Artificial drainage can change the ratings indicated in table 3. Drained areas of very poorly drained soils are seldom used for wildlife habitat.

Information in this subsection can be used to aid in—

1. Broad-scale planning of the use of soils for wildlife habitat, such as provided by parks, wildlife refuges, nature-study areas, and other recreational developments.
2. Selecting the better sites for creating, improving, or maintaining specific kinds of wildlife habitat elements.
3. Determining the relative degree of management intensity required for individual habitat elements.

4. Eliminating sites on which management for specific kinds of wildlife is difficult or not feasible.
5. Determining areas suitable for acquisition for wildlife use.

The headings in table 3 are explained in the following paragraphs.

Grain and seed crops include corn, sorghum, soybeans, wheat, barley, oats, rye, and other seed-producing annuals. Ragweed, foxtail, and other annual weeds that occur with grain crops benefit both game birds and songbirds.

Grasses and legumes are domestic grasses and legumes that are established by planting. Among these plants are bluegrass, fescue, bromegrass, timothy, redtop, orchardgrass, reed canarygrass, clover, trefoil, and alfalfa. On soils that are rated well suited, many kinds of plants that are suited to the climate can be maintained in adequate stands for at least 10 years. These soils have slopes of 0 to 15 percent, are well drained or moderately well drained, and have a moderately high or high available moisture capacity. Occasional flooding and stones in the surface layer are not serious concerns, because the soils are seldom tilled.

Wild herbaceous upland plants are perennial grasses and weeds that generally are established naturally. They include switchgrass, milkweed, thistles, daisies, goldenrod, strawberries, nightshade, and dandelion. Soils that are well suited to these plants vary greatly in texture, drainage, and slope. If drainage ranges between good and somewhat poor, slope is not a limiting characteristic. Stoniness and occasional flooding are not serious concerns.

Hardwood woody plants are nonconiferous trees, shrubs, and woody vines that produce nuts, fruits, buds, catkins, twigs, or foliage that wildlife eat. These plants generally are established naturally, but they are planted in some places. Among the native trees and other plants are oak, beech, cherry, maple, hickory, poplar, aspen, walnut, dogwood, roses, and briers. The soils that are well suited to these plants are deep or moderately deep, medium textured or moderately fine textured, and moderately well drained or somewhat excessively drained. The slope and stones on the surface and in the surface layer are of little significance.

Also in this group are several varieties of fruiting shrubs that are grown commercially for planting. Autumn-olive, Amur honeysuckle, Tatarian honeysuckle, crabapple, multiflora rose, viburnam, and dogwood are some of the shrubs that generally are available and can be planted on soils that are well suited to hardwood woody plants. Hardwoods that are not available commercially commonly can be transplanted successfully.

Coniferous cover plants are cone-bearing evergreen trees and shrubs that are used by wildlife primarily as cover, though they also provide browse and seeds. Among them are Norway spruce, white pine, arborvitae, redcedar, and juniper. The plants generally are established naturally in areas where the cover of weeds and sod is thin. The soils that are well suited to coniferous wildlife habitat are those on which plants grow slowly and closure of the canopy is delayed. It is important that branches be maintained close to the ground so that food and cover are readily available to rabbits, pheasants, and other small animals. If the trees quickly form a dense canopy that shuts out the light, the lower branches die.

On soils rated poorly suited for coniferous cover plants, widely spaced plants may quickly but temporarily produce desired growth characteristics. Establishment or maintenance, however, is difficult because these soils are well suited to competing hardwoods. Unless the stand is carefully managed, hardwoods invade and commonly overtop the conifers.

Wetland food and cover plants are wild, herbaceous, annual and perennial plants that grow on moist to wet sites. They include smartweed, wildmillet, rush, bulrush, spikerush, sedges, burreed, wildrice, buttonbush, rice cutgrass, and cattails. Soils that are well suited to these plants are nearly level and poorly drained or very poorly drained. Soils rated suited are nearly level and are somewhat poorly drained or frequently flooded. Depth, stoniness, and texture of the surface layer are of little concern.

Shallow water developments are impoundments or excavations that provide areas of shallow water near food and cover for wetland wildlife. Examples of such developments are shallow dugouts, level ditches, blasted potholes, and devices that keep the water 6 to 24 inches deep in marshes. Soils that are rated well suited to this use have slopes of 0 to 1 percent, are more than 36 inches deep to bedrock, and are poorly drained or very poorly drained. Soils having a rating of suited are nearly level and somewhat poorly drained. They are only 20 to 36 inches deep to bedrock in some places.

Ponds are dug-out water areas, or a combination of these and impoundments behind low dikes, in which the water is at a depth suitable for the production of fish or wildlife. If fish are produced, part of the pond should be at least 8 feet deep. Soils that are rated well suited are nearly level, more than 96 inches deep, and poorly drained or very poorly drained. In constructing an excavated impoundment, the difficulty or degree of limitation increases as slope increases and this increase reduces the feasible size of a pond.

Open-land wildlife includes pheasant, quail, meadowlarks, field sparrows, doves, cottontail rabbits, red foxes, and woodchucks. These birds and mammals normally make their home in areas of cropland, pasture, meadow, and lawns and in areas overgrown with grasses, herbs, and shrubs. They are also found along the fence lines and borders associated with open land.

Woodland wildlife are birds and mammals that prefer woodland habitat. Examples in Montgomery County are woodcocks, thrushes, vireos, scarlet tanagers, gray squirrels, fox squirrels, gray foxes, white-tailed deer, raccoons, opossum, and woodpeckers. They obtain food and cover in stands of hardwoods, coniferous trees, shrubs, or a mixture of these plants. They occasionally use open land or wetland near the woodland.

Wetland wildlife are birds and mammals that normally make their home in wet areas such as ponds, marshes, and swamps. Familiar examples are ducks, geese, rails, herons, shore birds, minks, and muskrats.

Each rating under "Kinds of wildlife" in table 3 is based on the ratings listed for the habitat elements in the first part of the table. For open-land wildlife, the rating

is based on the ratings shown for grain and seed crops, grasses and legumes, wild herbaceous upland plants, hardwood plants, and coniferous woody plants. The rating for woodland wildlife is based on the ratings listed for all the elements except grain and seed crops. For wetland wildlife the rating is based on the ratings shown for wetland food and cover plants, shallow water developments, and ponds.

TABLE 3.—*Estimated degree of limitations of soils for wildlife habitat and kinds of wildlife*

[The numeral 1 means well suited, 2 means suited, 3 means poorly suited, and 4 means unsuited. Gravel pits (Gp), Made land (Mb), and Quarries (Qu) are so variable that no estimates can be made]

Soil series and map symbols	Wildlife habitat elements								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous cover plants	Wet land food and cover plants	Shallow water developments	Ponds	Openland	Woodland	Wetland
Algiers: Ag	4	3	3	1	1	1	1	1	3	1	1
Borrow pits: [1] Bo	4	4	4	4	2	1	2	1	4	4	1
Brookston:											
Bp, Br, Bs	4	3	3	1	1	1	1	1	3	1	1
[2] Bu	4	4	4	4	4	4	4	4	4	4	4
Carlisle: Ca	4	4	4	4	4	3	1	1	4	4	2
Celina:											
CeA	1	1	1	1	3	3	3	3	1	1	3
CeB, CeB2	1	1	1	1	3	4	4	4	1	1	4
ClB	3	2	1	1	3	4	4	4	2	2	4
Corwin:											
CoA	1	1	1	1	3	3	3	3	1	1	3
CoB	1	1	1	1	3	3	4	4	1	1	4
Crosby:											
CsA	2	2	1	1	3	2	2	2	1	2	2
CtB	2	2	1	1	3	3	3	4	1	2	4
For Celina part of CtB, see Celina series											
[2] Cu	4	4	4	4	4	4	4	4	4	4	4
Dana: DaB	1	1	1	1	3	4	4	4	1	1	4
Fairmount: FaE2, FaF2	4	4	3	2	2	4	4	4	4	3	4
Fincastle: FcA	2	2	1	1	3	3	3	4	1	2	4
Fox:											
FkA, FkB, FlA, FlB, FlC2, FmA, FmB, FmC2	2	1	1	1	3	4	4	4	1	1	4
FmD2, FsC3	3	2	2	1	3	4	4	4	2	2	4
FuB, FuC, [2] FuF	4	4	4	4	4	4	4	4	4	4	4
Hennepin: HeE2, HeF2, HmF3	4	2	1	1	3	4	4	4	2	2	4
Kendallville:											
KeA, KeB	1	1	1	1	3	4	4	4	1	1	4
KeC2	2	2	2	1	3	4	4	4	2	2	4
Landes: Ld	3	2	2	1	3	4	4	4	2	2	4
Lanier: Lg	3	3	2	2	2	4	4	4	3	2	4
Lewisburg: LsB	1	1	1	1	3	4	4	4	1	1	4
Lorenzo: LxC2, LxD2	3	3	3	3	2	4	4	4	3	3	4
Medway: Md	1	1	1	1	3	4	3	3	1	1	4

See footnotes at end of table.

TABLE 3.—*Estimated degree of limitations of soils for wildlife habitat and kinds of wildlife*—Continued

Soil series and map symbols	Wildlife habitat elements								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous cover plants	Wet land food and cover plants	Shallow water developments	Ponds	Openland	Woodland	Wetland
Miamian:											
MIA, MIB, MIB2, MIC2, MID2	1	1	1	1	3	4	4	4	1	1	4
MmB	3	2	2	1	3	4	4	4	2	2	4
MnB3, MnC3, MnD3	2–3	2	2	1	3	4	4	4	2	2	4
MoB, MoC, MoE	4	4	4	4	4	4	4	4	4	4	4
Millsdale: MrA	4	3	3	1	1	1	1	4	3	1	2
Milton:											
MsA, MsB, MsB2, MsC2	2	1	1	1	3	4	4	4	1	1	4
MsD2, MtD3	3	3	2	2	2	4	4	4	3	2	4
MuB, MuC, MuD	4	4	4	4	4	4	4	4	4	4	4
Montgomery: Mv	4	3	3	1	1	1	1	1	3	1	1
Ockley: OcA, OcB	1	1	1	1	3	4	4	4	1	1	4
Plattville: PlB, PlC	2	1	1	1	3	4	4	4	1	1	4
Pyrmont: PyA	2	2	1	1	3	2	2	2	1	2	2
Randolph: RcA	2	2	1	1	3	2	2	4	1	2	2
Ritchey: ReB, ReB2, ReC2, ReE2, ReF2, RfD3.	3	3	2	2	2	4	4	4	3	2	4
Riverwash: Rh	4	4	4	3	4	3	4	4	4	4	4
Rodman: RlE2, RlF2	4	4	3	3	1	4	4	4	4	3	4
Ross:											
Rs	1	1	1	1	3	4	4	4	1	1	4
Rt	4	4	4	4	4	4	4	4	4	4	4
Russell:											
RuB, RvC2	1	1	1	1	3	4	4	4	1	1	4
RvD2	2	2	2	1	3	4	4	4	2	2	4
For Miamian part of RvC2 and RvD2, see MIA, MIB, MIB2, MIC2, and MID2.											
Shoals: Sh	2	2	1	1	3	2	2	3	1	2	2
Sloan: So	4	3	3	1	1	2	2	4	3	1	3
Thackery, till substratum: ThA.	1	1	1	1	3	3	3	3	1	1	3
Tippecanoe: TpA	1	1	1	1	3	3	3	3	1	1	3
Warsaw: WaA, WaB	2	1	1	1	3	4	4	4	1	1	4
Wea: WeA, WeB	1	1	1	1	3	4	4	4	1	1	4
Westland: Ws	4	3	3	1	1	1	1	1	3	1	1
Wynn: WyB2	2	1	1	1	3	4	4	4	1	1	4
Xenia:											
XeA	1	1	1	1	3	3	3	3	1	1	3
XeB	1	1	1	1	3	4	4	4	1	1	4

[1] Rated for Borrow pits in glacial till areas. Onsite inspection is needed to determine slope, natural drainage, and other soil features.
[2] Built-up areas.

Engineering Uses of the Soils [2]

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, facilities for water storage, structures for erosion control, drainage systems, and sewage disposal systems. Among the soil properties most important to the engineer are permeability to water, shrink-swell potential, compaction characteristics, texture, plasticity, and soil reaction. Depth to bedrock, depth to the water table, and topography are also important.

The information in this survey can be used to—

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils that will help in planning agricultural drainage systems, farm ponds, irrigation systems, waterways, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that aid in selecting locations for highways, pipelines, cable locations, and airports and in planning detailed investigations of selected locations.
4. Locate probable sources of gravel, sand, and other material suitable for construction.
5. Correlate performance of engineering structures with soil mapping units, and thus develop information that will be useful in designing and maintaining the structures.
6. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
7. Supplement information obtained from other published maps and reports and aerial photographs for the purpose of making maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area, including cost estimates and preliminary bids.

The engineering interpretations reported in tables 4, 5, and 6 do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads or excavations deeper than about 5 feet. The interpretations, together with the use of the soil map to identify the soils, do give information useful in planning more detailed field investigations and in indicating the kinds of problems that may be expected. It should be noted that similar or contrasting soils may be present within any mapping unit. Such inclusions are noted in the mapping unit descriptions if they were observed during the course of the survey.

Some of the terms used by soil scientists have a special meaning in soil science that may not be familiar to engineers. These terms are defined in the Glossary.

Engineering classification systems

The two systems most commonly used in classifying soils for engineering are the system approved by the American Association of State Highway Officials (AASHO) and the Unified system. Both are used in this survey.

The AASHO system (*2*) is used to classify soils according to those properties that affect use in highway construction. In this system all soil material is classified in seven principal groups. The groups range from A–1, which consists of soils that have the highest bearing strength and are the best soils for subgrade, to A–7, which consists of soils that have the lowest strength when wet. Within each group, the relative engineering value of the soil material is indicated by a group index number. The group index number is given in parentheses after the soil group symbol, as shown in table 4.

The Unified system (*16*) is based on identification of soils according to their texture and plasticity and their performance as engineering construction materials. In the Unified system, soil materials are identified as coarse grained (eight classes), fine grained (six classes), or highly organic (one class). The classification of the tested soils according to the Unified system is given in table 4, and the estimated classification of all the soils is given in table 5.

Engineering test data

Soil samples from 5 of the principal soil series in the county were tested by standard AASHO procedures to help evaluate the soils for engineering purposes. Only selected layers of each soil were sampled. The results of these tests are given in table 4.

Table 4 gives moisture-density, or compaction, data for the tested soils. If a soil material is compacted at successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed maximum dry density. Moisture-density data are important in earthwork, for as a rule soil material is most stable if it is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

The engineering soil classifications shown in table 4 are based on data obtained by grain-size analysis and by tests to determine liquid limit and plastic limit. The grain-size analysis was made by using a combination of the sieve and hydrometer methods. Table 4 shows the percentage of particles passing No. 4, No. 10, No. 40, and No. 200 sieves and the percentage of silt and clay. The percentage of clay obtained by the hydrometer methods is not used in naming the textural classes of soils used by the U.S. Department of Agriculture (USDA).

Tests for liquid limit and plastic limit measure the effect of water on the consistence of the soil material. As the moisture content of a soil increases from a very dry state, the material changes from a solid to a semisolid or plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content, expressed as a percentage of the oven-dry weight of the soil, at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to liquid state.

[2] Reviewed by LLOYD E. GILLOGLY, construction engineer, Soil Conservation Service, Columbus, Ohio.

The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which the soil material is in a plastic condition. Some silty and sandy soils are nonplastic; that is, they do not become plastic at any moisture content.

Engineering properties of the soils

Many of the problems in engineering and construction are caused by certain undesirable properties of the soil material, including lack of adequate drainage. Table 5 shows some estimated soil properties that are important in engineering, and it also gives estimated AASHO, Unified, and USDA classifications for the soils. The data are based on the results of laboratory tests, on experience with the same kinds of soils in other counties, and on information in other parts of this survey. Some of the headings in table 5 require explanation.

Depth to seasonal high water table refers to the average shallowest depth to which the water table rises in winter and early in spring. This water table is a perched or other type of water table. If less precipitation than normal falls in the wet season, the water table and saturated soil are farther from the surface. Soil conditions immediately after heavy precipitations are not considered. In all soils, particularly the steeper ones, the depth

TABLE 4.—*Engineering*

[Tests performed by Bureau of Public Roads (BPR) in accordance with

Soil name and location	Parent material	Ohio report number	Depth	Moisture-density [1]	
				Maximum dry density	Optimum moisture
			Inches	*Lb. per cu. ft.*	*Percent*
Fox sandy loam:					
NE¼NW¼ sec. 2, Miami Township, T. 2 N., R. 5 E.	Wisconsin-age loamy outwash over stratified sand and gravel.	16777	0–9	117. 0	13. 5
		16778	20–24	99. 0	21. 5
		16779	40–46	121. 8	1 . 4
Fox loam:					
NW¼SW¼ sec. 27, Miami Township, T. 2 N., R. 5 E.	Wisconsin-age loamy outwash over stratified sand and gravel.	16783	2–7	112. 0	15. 8
		16784	20–26	104. 7	19. 2
		16785	40–48	116. 6	12. 2
Fox silt loam:					
NE¼SE¼NE¼ sec. 19, German Township, T. 3 N., R. 4 E.	Wisconsin-age loamy outwash over stratified sand and gravel.	16791	0–8	112. 0	15. 8
		16792	14–20	102. 4	20. 3
		16793	31–41	132. 0	8. 0
Landes sandy loam:					
NW¼SW¼ sec. 29, German Township, T. 2 N., R. 5 E.	Recent alluvium.	16786	7–16	102. 4	20. 3
		16787	23–30	102. 4	20. 3
		16788	42–50	129. 5	8. 7
Milton silt loam:					
SW¼NW¼ sec. 33, Jefferson Township, T. 3 N., R. 5 E.	Wisconsin-age till over limestone.	16789	4–8	97. 4	22. 7
		16790	14–19	99. 9	21. 5
SE¼SE¼NW¼ sec. 14, Butler Township, T. 5 N.., R. 5 E.	Wisconsin-age till over limestone.	16800	0–5	97. 4	22. 7
		16801	12–17	97. 4	22. 7
Ross loam:					
NE¼NW¼SW¼ sec. 13, Butler Township, T. 3 N., R. 6 E.	Recent alluvium.	16797	0–6	97. 4	22. 7
		16798	27–33	104. 7	19. 2
		16799	40–46	114. 6	14. 6
Ross silt loam:					
SE¼SW¼ sec. 11, German Township, T. 3 N., R. 4 E.	Recent alluvium.	16780	0–8	102. 4	20. 3
		16781	22–28	112. 0	15. 8
		16782	40–45	104. 7	19. 2
Xenia silt loam:					
NW¼ sec. 15, Washington Township, T. 3 N., R. 5 E.	Silt capped Wisconsin-age calcareous loam till.	16794	0–8	99. 9	21. 5
		16795	20–27	104. 7	19. 2
		16796	45–54	117. 0	13. 5
NW¼NW¼ sec. 14, Washington Township, T. 2 N., R. 6 E.	Silt capped Wisconsin-age calcareous loam till.	16802	0–7	102. 4	20. 3
		16803	29–35	104. 7	19. 2
		16804	58–68	121. 7	11. 9

[1] Based on AASHO Designation T 99–57, Method A (*2*).

[2] Mechanical analyses according to AASHO Designation T 88–57 (*2*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

to the water table is generally greater late in spring, in summer, and in fall than is shown in table 5.

Depth to bedrock in most of the soils in the county is greater than 5 feet, but the Fairmount, Milton, Plattville, Wynn, Randolph, Ritchey, and Millsdale soils are less than 4 feet deep to bedrock.

Permeability, expressed in inches per hour, refers to the movement of water downward through the soil material in place. It is based largely upon the texture and structure of the soil material and on selected permeability tests. In these tests it is assumed that the soil is saturated, but that free drainage is not hindered.

Available moisture capacity is the capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point. It is expressed in table 5 as inches of water per inch of soil.

Reaction is given in pH values that indicate the degree of acidity or alkalinity of the soil material. Higher values indicate alkaline material and lower values acid material, as given in the Glossary. The values in table 5 represent the average pH as determined by field tests during mapping.

test data

standard procedures of the American Association of Highway Officials (AASHO) (*2*)]

Mechanical analysis [2]					Liquid limit	Plasticity index	Classification		
Percentage passing sieve—				Percentage smaller than 0.005 mm.			AASHO	Ohio [3]	Unified [4]
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)						
93	88	71	38	21	21	4	A-4(1)	A-4a	SM
91	79	64	48	34	39	15	A-6(4)	A-6a	SM-SC
40	31	7	2	0	[5] NP	[5] NP	A-1-a(0)	A-1a	GW
----------	100	73	60	30	34	11	A-6(5)	A-6a	ML-CL
97	91	50	41	40	50	22	A-7-6(5)	A-7-6	SM-SC
39	32	3	1	0	NP	NP	A-1-a(0)	A-1-a	GW
93	86	79	58	25	20	3	A-4(5)	A-4-a	ML
84	69	54	37	32	23	12	A-6(1)	A-6a	SC
31	25	10	6	0	NP	NP	A-1a(0)	A-1-a	GW-GM
----------	100	99	70	20	NP	NP	A-4(8)	A-4b	ML
96	91	88	61	25	NP	NP	A-4(5)	A-4a	ML
39	31	10	3	0	NP	NP	A-1-a(0)	A-1-a	GW
----------	100	97	84	40	34	11	A-6(8)	A-6a	CL
----------	100	98	92	75	40	15	A-6(10)	A-6a	ML-CL
----------	100	96	84	42	37	12	A-6(9)	A-6a	ML-CL
95	80	78	70	50	42	18	A-7-6(11)	A-7-6	ML-CL
----------	100	99	83	33	36	10	A-4(8)	A-4b	ML-CL
----------	100	99	64	32	28	8	A-4(6)	A-4a	CL
----------	100	84	32	21	NP	NP	A-3(0)	A-3a	SM
----------	100	94	74	32	27	7	A-4(8)	A-4a	ML-CL
----------	----------	100	55	28	23	5	A-4(4)	A-4a	ML-CL
----------	----------	100	76	32	26	11	A-6(8)	A-6a	CL
----------	100	99	96	37	30	6	A-4(8)	A-4b	ML-CL
----------	100	99	95	47	37	16	A-6(10)	A-6b	CL
95	84	78	65	34	24	6	A-4(6)	A-4a	ML-CL
----------	100	97	94	32	NP	NP	A-4(8)	A-4b	ML
----------	100	97	90	42	37	18	A-6(11)	A-6b	CL
91	73	63	48	26	23	7	A-4(3)	A-4a	ML-CL

[3] Based on Classification of Soils, Ohio State Testing Laboratory, February 1, 1955.

[4] SCS and BPR (Bureau of Public Roads) have agreed to consider that all soils having plasticity indexes within two points of A-line are to be given a borderline classification. Examples of borderline classifications obtained by this use are SM-SC, ML-CL, and GW-GM.

[5] NP=Nonplastic.

TABLE 5.—*Estimated engineering*

[Borrow pits (Bo), Gravel pits (Gp), Made land (Mb), Quarries (Qu), and Riverwash (Rh) are not listed in this table. An asterisk in the may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for refer-

Soil series and map symbols	Depth to—		Depth from surface (typical profile)	Dominant USDA texture	Engineering classification		Coarse fraction greater than 3 inches
	Seasonal high water table	Bedrock			Unified	AASHO	
	Feet	*Feet*	*Inches*				*Percent*
Algiers: [1] Ag	0–1½	>5	0–20	Silt loam	ML, ML–CL	A–4	—
			20–60	Silty clay loam	CL, ML–CL	A–6, A–7	—
*Brookston: Bp, Br, Bs, Bu. Properties of Urban land in Bu are variable and were not estimated.	0	>5	0–12	Silty clay loam	MH, ML–CL	A–7	—
			12–36	Silty clay loam	CH, ML–CL	A–7	—
			36–60	Loam	CL, ML–CL	A–4, A–6	—
Carlisle: Ca	0	>5	0–82	Muck	Pt	—	—
			82–90	Clay	CH	A–6, A–7	—
Celina: CeA, CeB, CeB2,[3] ClB	1½–3	>5	0–10	Silt loam	ML, ML–CL	A–4	—
			10–30	Silty clay loam, silty clay, and loam.	CL, ML–CL	A–6, A–7	—
			30–60	Loam	CL,ML–CL	A–4	—
Corwin: CoA, CoB	1½–3	>5	0–9	Silt loam	ML, ML–CL	A–4	—
			9–36	Silty clay loam, and clay loam.	CL, ML–CL	A–6, A–7	—
			36–60	Loam	CL, ML–CL	A–4	—
*Crosby: CsA, CtB, Cu. For Celina part of CtB, see Celina series. Properties of Urban land in Cu are variable and were not estimated.	½–1½	>5	0–8	Silt loam	ML, ML–CL	A–4	—
			8–26	Silty clay loam and clay loam.	ML–CL, CH	A–7	—
			26–60	Loam	CL, ML–CL	A–4, A–6	—
Dana: DaB	1½–3	>5	0–7	Silt loam	ML, ML–CL	A–4	—
			7–28	Silty clay loam	ML–CL	A–6, A–7	—
			28–36	Clay loam	CL, ML–CL	A–6, A–7	—
			36–60	Loam	CL, ML–CL	A–4	—
Fairmount: FaE2, FaF2	>3	<1–1½	0–7	Silty clay loam	ML, CL	A–4, A–6	5
			7–19	Silty clay	ML–CL, CH	A–6, A–7	5–15
			19–24	Interbedded limestone and calcareous clay shale.			
Fincastle: FcA	½–1½	>5	0–19	Silt loam	ML, ML–CL	A–4	—
			19–38	Silty clay loam and clay loam.	CL, ML–CL	A–6, A–7	—
			38–60	Loam	CL, ML–CL	A–4, A–6	—
*Fox: FkA, FkB, FlA, FlB, FlC2, FmA, FmB, FmC2, FmD2, FsC3, FuB, FuC, FuF. FkA and FkB have a slightly higher sand content throughout than the other soils. Properties of Urban land in FuB, FuC, and FuF are variable and were not estimated.	>3	>5	0–11	Silt loam	ML, ML–CL	A–4	—
			11–26	Sandy clay loam	ML–CL, SC	A–6, A–7	—
			26–60	Sand and gravel	GW–GM, GW, GP	A–1	2–5

See footnotes at end of table.

properties of soils

first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such mapping units ring to other series that appear in the first column of this table. The sign > means more than; the sign < means less than]

Percentage passing sieve—				Perme-ability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Steel	Concrete
				Inches per hour	*Inches per inch of soil*	*pH*			
100	90–100	80–90	75–85	0. 63–2. 0	0. 16–0. 19	6. 1–7. 3	Moderate	---	Low.
100	90–100	85–95	70–80	0. 2–0. 63	0. 16–0. 20	6. 1–7. 3	Moderate to high.	High	Low.
---	100	90–100	85–95	0. 63–2. 0	0. 20–0. 23	6. 1–7. 3	Moderate to high.	---	Low.
100	90–100	90–100	85–90	0. 63–2. 0	0. 17–0. 20	6. 1–7. 3	Moderate to high.	High	Low.
90–100	85–95	75–90	65–75	0. 2–0. 63	0. 06–0. 10	[2] 7. 4–8. 4	Low	High	Low.
---	---	---	---	0. 2–0. 63	0. 20–0. 25	6. 6–7. 3	Variable	High	Low.
---	100	95–100	90–100	0. 06–0. 2	0. 06–0. 10	7. 4–8. 4	High	High	Low.
100	90–100	90–100	70–85	0. 63–2. 0	0. 17–0. 20	5. 1–6. 5	Low	---	Moderate to low.
100	90–100	80–95	70–85	0. 63–2. 0	0. 16–0. 19	5. 1–6. 5	Moderate to high.	High	Moderate.
75–95	70–90	60–75	50–65	0. 2–0. 63	0. 06–0. 10	[2] 7. 4–8. 4	Low	High	Low.
---	100	90–100	80–90	0. 63–2. 0	0. 18–0. 22	5. 1–6. 5	Low	---	Moderate to low.
100	95–100	90–100	85–95	0. 63–2. 0	0. 16–0. 19	5. 6–7. 3	Moderate to high.	High	Low to moderate.
90–100	80–90	60–75	55–65	0. 2–0. 63	0. 06–0. 10	[2] 7. 4–8. 4	Low	High	Low.
100	90–100	90–100	85–95	0. 63–2. 0	0. 17–0. 20	5. 1–6. 5	Low	---	Moderate to low.
100	90–100	90–100	80–95	0. 2–0. 63	0. 15–0. 19	5. 1–7. 3	High	High	Moderate to low.
85–95	80–90	75–85	55–65	0. 2–0. 63	0. 06–0. 10	[2] 7. 4–8. 4	Low	High	Low.
100	90–100	85–95	80–90	0. 63–2. 0	0. 18–0. 22	5. 6–6. 5	Low	---	Low to moderate.
100	90–100	85–95	80–90	0. 63–2. 0	0. 16–0. 20	6. 1–7. 3	Moderate	High	Low.
100	95–100	80–90	70–80	0. 2–0. 63	0. 15–0. 18	6. 6–7. 3	Moderate	Moderate	Low.
85–95	80–90	75–85	55–65	0. 2–0. 63	0. 14–0. 17	[2] 7. 4–8. 4	Low	Moderate	Low.
90–100	90–100	80–90	70–85	0. 63–2. 0	0. 16–0. 22	6. 6–7. 3	Low	---	Low.
100	80-100	75–90	70–90	0. 2–0. 63	0. 14–0. 18	6. 6–7. 8	Moderate	High	Low.
100	100	90–100	80–95	0. 63–2. 0	0. 16–0. 20	5. 1–6. 5	Low	---	Moderate.
100	100	90–100	85–100	0. 2–0. 63	0. 15–0. 18	5. 1–7. 3	Moderate	High	Moderate to low.
90–100	85–90	70–85	55–65	0. 2–0. 63	0. 06–0. 10	[2] 7. 4–8. 4	Low	High	Low.
85–100	75–100	65–100	55–70	0. 63–2. 0	0. 16–0. 20	5. 1–6. 5	Low	---	Low to moderate.
80–100	65–95	55–95	40–75	0. 63–2. 0	0. 14–0. 18	5. 6–6. 5	Moderate to high.	Moderate	Low to moderate.
25–55	20–35	5–20	4–12	6. 3–12. 0+	0. 02–0. 05	[2] 7. 4–8. 4	Low	Low	Low.

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Dominant USDA texture	Engineering classification: Unified	Engineering classification: AASHO	Coarse fraction greater than 3 inches
	Feet	*Feet*	*Inches*				*Percent*
*Hennepin: HeE2, HeF2, HmF3. For Miamian part, see Miamian soils.	>3	>5	0–4	Silt loam	ML, ML-CL	A-4	
			4–12	Clay loam to loam	ML, CL	A-4, A-6	
			12–60	Loam	CL, ML-CL	A-4, A-6	
Kendallville: KeA, KeB, KeC2	>3	>5	0–9	Silt loam	ML, ML-CL	A-4	
			9–26	Silty clay loam and clay loam.	CL, ML-CL	A-6, A-7	
			26–36	Sandy clay loam	SC, CL	A-6	
			36–60	Loam	CL, ML-CL	A-4	
Landes: [1] Ld	>3	>5	0–32	Sandy loam and fine sandy loam.	SM	A-2, A-4	
			32–60	Sand and gravel	GM, SW-SM, SM	A-1, A-2	5–10
Lanier: [1] Lg	>3	>5	0–20	Sandy loam	SM	A-2, A-4	
			20–60	Sand and gravel	GW-GM, GM, SM, SW-SM	A-1, A-2	5–10
Lewisburg: LsB	1½–3	>5	0–7	Silt loam	ML, ML-CL	A-4	
			7–15	Clay to clay loam	CL, CH	A-6, A-7	
			15–60	Loam	CL, ML-CL	A-4, A-6	
*Lorenzo: LxC2, LxD2. For Rodman part, see Rodman soils.	>3	>5	0–6	Loam	ML	A-4	
			6–17	Clay loam to gravelly clay loam.	SC	A-4, A-6	
			17–60	Sand and gravel	GW-GM, GW, GP	A-1	5–10
Medway: [1] Md	1½–3	>5	0–13	Silt loam	ML, ML-CL	A-4	
			13–29	Loam	ML	A-4	
			29–45	Sandy loam	SM	A-2, A-4	
			45–60	Gravelly sand	SM, SW-SM	A-1, A-2	
*Miamian: MlA, MlB, MlB2, MlC2, MlD2,[4] MmB, MnB3, MnC3, MnD3, MoB, MoC, MoE. Properties of Urban land in MoB, MoC, and MoE are variable and were not estimated.	>3	>5	0–7	Silt loam	ML, ML-CL	A-4	
			7–24	Clay loam to clay	CL	A-6, A-7	
			24–60	Loam	CL, ML-CL	A-4	
Millsdale: MrA	0–½	1½–3½	0–7	Silty clay loam	CL, ML-CL	A-6, A-7	
			7–20	Silty clay loam	CL, ML-CL	A-6, A-7	
			20–36	Clay and silty clay	CH, ML-CL	A-6, A-7	2–5
			36–40	Limestone.			
*Milton: MsA, MsB, MsB2, MsC2, MsD2, MtD3, MuB, MuC, MuD. Properties of Urban land in MuB, MuC, and MuD are variable and were not estimated.	>3	1½–3½	0–9	Silt loam	ML, ML-CL	A-4, A-6	
			9–25	Silty clay loam	CL, ML-CL	A-6, A-7	
			25–28	Clay	CH, ML-CL	A-6, A-7	2–5
			28–35	Limestone.			
Montgomery: Mv	0–½	>5	0–8	Silty clay loam	ML, CL	A-4, A-6	
			8–33	Silty clay	ML-CL, CH	A-6, A-7	
			33–60	Clay	ML-CL, CH	A-6, A-7	

See footnotes at end of table.

properties of soils—Continued

Percentage passing sieve—				Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Steel	Concrete
				Inches per hour	*Inches per inch of soil*	*pH*			
90-100	90-100	80-90	75-80	0. 63-2. 0	0. 15-0. 19	6. 1-6. 5	Low		Low.
90-100	90-100	70-90	65-75	0. 63-2. 0	0. 14-0. 18	6. 1-7. 3	Low to moderate	Moderate	Low.
90-100	80-90	70-80	55-65	0. 2-0. 63	0. 06-0. 10	[2] 7. 4-8. 4	Low	Low	Low.
100	90-100	70-90	65-80	0. 63-2. 0	0. 17-0. 20	5. 1-7. 3	Low		Moderate to low.
100	90-100	75-95	65-90	0. 63-2. 0	0. 16-2. 0	5. 1-6. 0	Moderate	Moderate	Moderate.
80-90	70-80	60-75	40-55	0. 63-2. 0	0. 12-0. 15	5. 6-7. 3	Moderate to low.	Moderate	Moderate to low.
90-100	85-95	70-80	55-70	0. 2-0. 63	0. 06-0. 10	[2] 7. 4-8. 4	Low	Low	Low.
95-100	75-90	30-50	25-40	6. 3-12. 0	0. 08-0. 12	6. 6-7. 8	Low	Low	Low.
50-75	30-50	20-40	5-35	6. 3-12. 0+	0. 02-0. 05	[2] 7. 4-8. 4	Low	Low	Low.
95-100	75-90	30-50	25-40	6. 3-12. 0	0. 09-0. 14	6. 6-7. 8	Low	Low	Low.
50-75	30-50	20-40	5-35	6. 3-12. 0+	0. 02-0. 05	7. 4-8. 4	Low	Low	Low.
100	95-100	85-95	70-80	0. 63-2. 0	0. 17-0. 20	5. 6-7. 3	Low		Moderate to low.
100	95-100	80-95	75-85	0. 2-0. 63	0. 12-0. 17	6. 1-7. 3	Moderate to high.	High	Low.
90-95	85-90	70-85	55-70	0. 2-0. 63	0. 06-0. 10	[2] 7. 4-8. 4	Low	Moderate	Low.
90-100	90-100	80-90	65-75	2. 0-6. 3	0. 14-0. 18	6. 6-7. 3	Low		Low.
70-90	55-80	50-75	40-50	2. 0-6. 3	0. 14-0. 18	6. 6-7. 3	Moderate to low.	Low	Low.
25-55	20-35	5-20	4-12	6. 3-12. 0+	0. 02-0. 05	[2] 7. 4-8. 4	Low	Low	Low.
100	100	80-90	70-80	0. 63-2. 0	0. 17-0. 22	[2] 6. 6-7. 8	Low		Low.
100	90-100	75-90	65-90	0. 63-2. 0	0. 15-0. 19	[2] 6. 6-7. 8	Low	Low	Low.
95-100	80-85	40-50	30-45	0. 63-2. 0	0. 09-0. 14	[2] 6. 6-7. 8	Low	Moderate	Low.
100	55-75	50-70	5-30	2. 0-6. 3+	0. 02-0. 05	[2] 7. 4-8. 4	Low	Moderate	Low.
90-100	90-100	80-90	70-90	0. 63-2. 0	0. 17-0. 20	5. 1-6. 5	Low		Moderate to low.
90-100	85-95	75-90	70-85	0. 2-0. 63	0. 14-0. 19	5. 1-6. 5	Moderate	High	Moderate to low.
75-95	75-90	65-75	55-70	0. 2-0. 63	0. 06-0. 10	[2] 7. 4-8. 4	Low	Low	Low.
100	95-100	90-100	80-90	0. 63-2. 0	0. 16-0. 19	5. 6-7. 3	Moderate to high.		Moderate to low.
95-100	90-100	85-100	85-95	0. 2-0. 63	0. 15-0. 19	6. 1-7. 3	High	High	Low.
90-100	90-100	85-95	85-95	0. 2-0. 63	0. 13-0. 15	[2] 6. 6-7. 8	High	High	Low.
95-100	90-100	85-95	80-90	0. 63-2. 0	0. 17-0. 20	5. 6-6. 5	Low		Low to moderate.
95-100	80-100	75-100	70-95	0. 63-2. 0	0. 16-0. 19	5. 6-6. 5	Moderate to high.	Moderate	Low to moderate.
95-100	90-100	85-95	80-90	0. 2-0. 63	0. 13-0. 16	6. 6-7. 8	High	Moderate	Low.
100	100	90-100	80-100	0. 63-2. 0	0. 17-0. 22	6. 1-7. 3	Moderate		Low.
100	100	90-100	90-100	0. 2-0. 63	0. 13-0. 16	6. 6-7. 3	High	High	Low.
100	100	90-100	90-100	<0. 2	0. 13-0. 16	6. 6-8. 4	High	High	Low.

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Dominant USDA texture	Engineering classification Unified	Engineering classification AASHO	Coarse fraction greater than 3 inches
	Feet	*Feet*	*Inches*				*Percent*
Ockley: OcA, OcB	>3	>5	0–13	Silt loam	ML, ML-CL	A-4	
			13–40	Silty clay loam to clay loam.	CL, ML-CL	A-6, A-7	
			40–48	Sandy clay	SC, CL	A-6, A-7	
			48–60	Sand and gravel	GW, GW-GM	A-1	5–10
Plattville: PlB, PlC	>3	1½–3½	0–10	Silt loam	ML, ML-CL	A-4	
			10–23	Silty clay loam and clay loam.	CL, ML-CL	A-6	
			23–27	Silty clay loam	CL, ML-CL	A-6, A-7	2–5
			27–30	Limestone.			
Pyrmont: PyA	½–1½	>5	0–9	Silt loam	ML, ML-CL	A-4	
			9–16	Clay loam or clay	CL, CH	A-6, A-7	
			16–60	Loam	CL, ML-CL	A-4, A-6	
Randolph: RcA	½–1½	1½–3	0–14	Silt loam	ML, ML-CL	A-4, A-6	
			14–23	Clay	CH, ML-CL	A-6, A-7	
			23–31	Silty clay loam	CH, ML-CL	A-6, A-7	
			31–35	Limestone.			
Ritchey: ReB, ReB2, ReC2, ReE2, ReF2, RfD3.	>3	1–2	0–6	Silt loam	ML, ML-CL	A-4	
			6–18	Silty clay loam	ML-CL, MH	A-6, A-7	2–5
			18–24	Limestone.			
*Rodman: RlE2, RlF2. For Fox part, see Fox soils.	>3	>5	0–4	Loam	ML	A-4	
			4–10	Gravelly loam	SM, ML	A-4	2–5
			10–60	Sand and gravel	GM-GW, GW	A-1	5–10
*Ross: Rs,[1] Rt. Properties of Urban land in Rt are variable and were not estimated.	>3	>5	0–22	Silt loam	ML, ML-CL	A-4	
			22–34	Fine sandy loam	SM, ML	A-2, A-4	
			34–60	Loam or silt loam	ML	A-4	
*Russell: RuB, RvC2, RvD2. For Miamian part of RvC2 and RvD2, see Miamian soils.	>3	>5	0–12	Silt loam	ML, ML-CL	A-4	
			12–24	Silty clay loam	CL, ML-CL	A-6	
			24–39	Clay loam	CL, ML-CL	A-6	
			39–60	Loam	CL, ML-CL	A-4, A-6	2–5
Shoals:[1] Sh	½–1½	>5	0–13	Silt loam	ML	A-4	
			13–60	Sandy loam to sandy clay loam.	SM, ML	A-2, A-4	
Sloan:[1] So	0	>5	0–12	Silt loam	ML, ML-CL	A-4, A-6	
			12–25	Clay loam	CL, ML-CL	A-6	
			25–60	Gravelly loam	SM, ML	A-4	2–5
Thackery: ThA	1½–3	>5	0–15	Silt loam	ML, ML-CL	A-4	
			15–30	Silty clay loam or clay loam.	CL, ML-CL	A-6, A-7	
			30–45	Gravelly clay loam	SM, ML	A-4, A-6	
			45–60	Loam	CL, ML-CL	A-4	2–5

See footnotes at end of table.

properties of soils—Continued

Percentage passing sieve—				Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Steel	Concrete
				Inches per hour	*Inches per inch of soil*	*pH*			
100	100	80–100	70–95	0. 63–2. 0	0. 17–0. 22	5. 6–7. 3	Low		Low to moderate.
95–100	90–100	80–95	70–90	0. 63–2. 0	0. 16–0. 20	5. 6–6. 0	Moderate	Moderate	Moderate.
95–100	90–100	60–85	45–70	0. 63–2. 0	0. 13–0. 16	6. 1–7. 3	Moderate	Moderate	Low.
25–55	20–35	5–20	4–12	6. 3–12. 0+	0. 02–0. 05	[2] 7. 4–8. 4	Low	Low	Low.
95–100	90–100	80–90	70–90	0. 63–2. 0	0. 17–0. 20	5. 6–6. 5	Low		Moderate to low.
90–100	85–95	80–90	70–90	0. 2–0. 63	0. 16–0. 19	5. 6–6. 5	Moderate to high.	Moderate	Moderate to low.
90–100	85–95	80–90	75–85	0. 2–0. 63	0. 17–0. 19	[2] 6. 6–7. 8	High	Moderate	Low.
100	95–100	85–95	70–80	0. 63–2. 0	0. 17–0. 20	5. 6–6. 5	Low		
100	95–100	80–95	75–85	0. 06–0. 6	0. 14–0. 18	6. 1–7. 3	Moderate to high.	High	Low.
90–95	85–90	70–85	55–70	0. 2–0. 63	0. 06–0. 10	[2] 7. 4–8. 4	Low	High	Low.
100	100	80–90	75–85	0. 63–2. 0	0. 17–0. 20	5. 6–7. 3	Moderate		Moderate to low.
100	100	85–95	80–90	0. 2–0. 63	0. 13–0. 15	5. 1–6. 5	High	High	Moderate.
90–100	85–95	80–95	75–90	0. 2–0. 63	0. 15–0. 18	6. 1–7. 3	Moderate to high.	High	Low.
100	95–100	80–90	75–85	0. 63–2. 0	0. 17–0. 20	5. 6–7. 3	Low		Low to moderate.
100	90–95	85–90	80–90	0. 63–2. 0	0. 13–0. 17	6. 1–7. 3	Moderate to high.	Moderate	Low.
90–100	90–100	75–90	65–75	6. 3–12. 0	0. 14–0. 18	6. 6–7. 8	Low	Low	Low.
70–90	55–70	50–60	40–55	6. 3–12. 0	0. 08–0. 14	[2] 7. 4–8. 4	Low	Low	Low.
25–55	20–35	5–20	4–12	6. 3–12. 0+	0. 02–0. 05	[2] 7. 4–8. 4	Low	Low	Low.
90–100	90–100	80–90	70–85	0. 63–2. 0	0. 18–0. 24	[2] 6. 6–7. 8	Low		Low.
100	100	50–70	30–55	0. 63–2. 0	0. 12–0. 15	[2] 6. 6–7. 8	Low	Moderate to low.	Low.
95–100	80–100	75–85	65–80	0. 63–2. 0	0. 16–0. 18	[2] 6. 6–7. 8	Low	Moderate	Low.
100	100	90–100	85–95	0. 63–2. 0	0. 17–0. 22	5. 6–6. 5	Low		Moderate to low.
100	90–100	85–100	85–95	0. 63–2. 0	0. 16–0. 19	5. 1–6. 0	Moderate	Moderate	Moderate.
100	90–100	75–90	65–80	0. 2–0. 63	0. 16–0. 19	5. 6–7. 3	Moderate	Moderate	Moderate to low.
100	90–100	80–90	75–85	0. 2–0. 63	0. 06–0. 10	[2] 7. 4–8. 4	Low	Low	Low.
100	100	80–90	60–75	0. 63–2. 0	0. 18–0. 22	6. 1–7. 8	Low		Low.
100	90–100	60–80	30–60	0. 63–2. 0	0. 16–0. 19	[2] 6. 6–7. 8	Low	High	Low.
100	90–100	80–90	75–85	0. 63–2. 0	0. 18–0. 22	6. 1–7. 3	Low		Low.
90–100	80–95	75–85	70–80	0. 2–0. 63	0. 17–0. 20	6. 6–7. 8	Moderate	High	Low.
80–90	50–60	45–55	40–55	0. 63–2. 0	0. 08–0. 12	6. 6–7. 8	Low	High	Low.
100	90–100	75–90	70–85	0. 63–2. 0	0. 17–0. 20	5. 6–7. 3	Low		Low to moderate.
100	80–90	75–90	75–85	0. 63–2. 0	0. 16–0. 19	5. 6–6. 5	Moderate	High	Low to moderate.
80–90	65–75	55–70	40–60	0. 63–2. 0	0. 12–0. 16	6. 1–7. 3	Moderate	High	Low.
95–100	80–90	75–90	65–85	0. 2–0. 63	0. 06–0. 10	[2] 7. 4–8. 4	Low	Moderate	Low.

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TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Dominant USDA texture	Engineering classification: Unified	Engineering classification: AASHO	Coarse fraction greater than 3 inches
	Feet	*Feet*	*Inches*				*Percent*
Tippecanoe: TpA	1½–3	>5	0–12	Silt loam	ML, ML–CL	A–4, A–6	
			12–36	Clay loam	CL, ML–CL	A–6, A–7	
			36–45	Loam	ML, ML–CL	A–4	
			45–60	Loamy sand, sand and gravel.	GW, GM, GP	A–1, A–2	5–10
Urban land: Ua, Ug, Um. Properties are variable and were not estimated.							
Warsaw: WaA, WaB	>3	>5	0–6	Silt loam	ML, ML–CL	A–4	
			6–25	Silty clay loam to clay loam.	CL, ML–CL	A–6, A–7	
			25–32	Gravelly sandy loam	SM	A–2	
			32–60	Sand and gravel	GW–GM, GP, GW	A–1	5–10
Wea: WeA, WeB	>3	>5	0–14	Silt loam	ML, ML–CL	A–4	
			14–47	Silty clay loam to clay loam.	CL, ML–CL	A–6, A–7	
			47–60	Sand and gravel	GW–GM, GW, GP	A–1	5–10
Westland: Ws	0–½	>5	0–8	Silty clay loam	ML, ML–CL	A–4, A–6	
			8–28	Silty clay loam	ML–CL, CH	A–6, A–7	
			28–45	Sandy loam	SM	A–2	
			45–60	Sand and gravel	GW–GM, GW, GP	A–1	5–10
Wynn: WyB2	>3	1½–3½	0–14	Silt loam	ML, ML–CL	A–4	
			14–29	Silty clay loam or clay loam.	CL, ML–CL	A–6, A–7	2–5
			29–35	Limestone and limestone and shale.			
Xenia: XeA, XeB	1½–3	>5	0–11	Silt loam	ML, ML–CL	A–4	
			11–35	Silty clay loam	CL, ML–CL	A–6	
			35–45	Clay loam	CL, ML–CL	A–6, A–7	
			45–78	Loam	CL, ML–CL	A–4, A–6	

[1] Subject to flooding.
[2] Calcareous.

properties of soils—Continued

Percentage passing sieve—				Perme-ability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Steel	Concrete
				Inches per hour	*Inches per inch of soil*	*pH*			
100	95–100	80–90	70–85	0. 63–2. 0	0. 17–0. 20	5. 6–6. 5	Low		Low to moderate.
100	90–100	80–90	65–80	0. 63–2. 0	0. 16–0. 19	5. 6–7. 3	Moderate	High	Low to moderate.
95–100	80–90	70–85	60–80	0. 63–2. 0	0. 14–0. 18	6. 1–7. 3	Low	Moderate	Low.
25–60	20–50	5–30	4–25	6. 3–12. 0+	0. 03–0. 06	[2] 7. 4–8. 4	Low	Moderate	Low.
100	90–100	75–85	65–80	0. 63–2. 0	0. 17–0. 22	5. 6–7. 3	Low		Low to moderate.
90–100	85–90	75–90	65–85	0. 63–2. 0	0. 16–0. 19	5. 6–7. 3	Moderate	Moderate	Low to moderate.
80–95	55–70	40–60	20–30	0. 63–2. 0	0. 01–0. 10	6. 6–7. 3	Low	Low	Low.
25–55	20–35	5–20	4–12	6. 3–12. 0+	0. 03–0. 06	[2] 7. 4–8. 4	Low	Low	Low.
100	90–100	80–95	75–90	0. 63–2. 0	0. 18–0. 22	5. 6–7. 3	Low		Low to moderate.
100	90–100	85–95	70–85	0. 63–2. 0	0. 16–0. 20	6. 1–7. 3	Moderate	Moderate to low.	Low.
25–55	20–35	5–20	4–12	6. 3–12. 0+	0. 03–0. 06	[2] 7. 4–8. 4	Low	Low	Low.
100	90–100	85–95	80–90	0. 63–2. 0	0. 18–0. 22	5. 6–6. 3	Low to moderate.		Low.
100	90–100	85–95	80–90	0. 63–2. 0	0. 16–0. 19	5. 6–7. 3	Moderate	High	Low.
95–100	80–90	40–60	25–35	2. 0–6. 3	0. 06–0. 10	6. 6–7. 8	Low	High	Low.
25–50	20–35	5–20	4–12	6. 3–12. 0+	0. 03–0. 05	[2] 7. 4–8. 4	Low	High	Low.
100	100	90–100	75–90	0. 63–2. 0	0. 17–0. 22	5. 6–6. 5	Low		Moderate.
100	80–95	80–90	75–90	0. 2–0. 63	0. 16–0. 19	6. 1–7. 3	Moderate	Moderate	Low.
100	100	90–100	75–90	0. 63–2. 0	0. 17–0. 20	5. 6–6. 5	Low		Low to moderate.
100	95–100	90–95	75–85	0. 63–2. 0	0. 16–0. 19	5. 1–6. 5	Moderate	High	Low to moderate.
100	90–100	80–90	65–80	0. 2–0. 63	0. 16–0. 19	6. 1–7. 8	Moderate	High	Low.
90–100	85–95	70–85	55–70	0. 2–0. 63	0. 06–0. 10	[2] 7. 4–8. 4	Low	Moderate	Low.

[3] For ClB, coarse fraction greater than 3 inches is 10 to 25 percent.
[4] For MmB, coarse fraction greater than 3 inches s 10 to 25 percent.

Shrink-swell potential is an indication of the volume change expected when the moisture content of the soil material changes. The soils rated high in shrink-swell potential are normally undesirable for some engineering uses. This is because the increase in volume, or swelling, when the dry soil is wetted is normally accompanied by a loss in bearing capacity. Also, pressure against walls and foundations increases during swelling. Shrink-swell potential is estimated primarily on the basis of the amount and kind of clay the soil contains. In general, soils classified as CH and A–7 have a high shrink-swell potential. Soils that have low shrink-swell potential are clean sand and gravel (single grain), soils containing small amounts of nonplastic to slightly plastic fines, and most other nonplastic to slightly plastic soils.

Corrosion potential is important because it indicates the effect that soils have on utility pipelines and concrete installations in soils. Ratings of corrosivity are made for uncoated steel pipelines and standard concrete mix.

Engineering interpretations

Table 6 indicates the suitability of the soils for various engineering uses. It also names soil features and site limitations that affect the use of the soils for highway and conservation engineering.

The column headings in table 6 are explained in the following paragraphs.

Suitability for winter grading largely depends on soil texture and natural drainage. Seasonally wet, clayey soils are less suitable for grading in winter than well-drained, coarse-textured soils.

Susceptibility to frost action largely depends on the presence of seepage or capillary water that feeds expanding ice lenses. Soils that supply water to a freezing zone are most susceptible to damaging frost action. Soils of this kind include those that have a seasonal high water table and those that have texture conducive to capillary action.

Suitability as a source of topsoil refers to suitability of the surface layer of the soil for growing grass or other plants when the soil material is used as topsoil on the slopes of cuts and fills. The ratings depend mostly on the natural fertility of the soil material, texture, the content of organic matter, and the presence or absence of large pieces of stone. Dana soils, for example, are good for topsoil because the surface layer is fertile, medium textured, high in organic-matter content, and free of stones.

Suitability of a soil as a source of sand and gravel depends on the presence and quality of granular (coarse-grained) material. But a rating of good does not necessarily mean that commercial operations would be profitable in all areas of that particular soil. In some areas the layers of sand and gravel are thin, or other considerations might make it impractical to remove the sand and gravel commercially.

Suitability of a soil for road fill was rated on the basis of plasticity, content of water, compaction characteristics, and erodibility. Well-graded, coarse-grained material or mixtures of clay and coarse-grained material are desirable for road fill. Highly plastic, clayey soils; poorly graded, silty soils; and organic soils are poorly suited for road fill because they are difficult to compact and are low in stability.

Highway location is affected by a high water table, flooding, relief, natural drainage, and the presence of muck or bedrock. These features influence the selection of routes of highways and of secondary roads, streets, or roads in parks. Identification of limiting features can influence the route selection, design, and final costs of the highway.

Pipeline construction and maintenance are affected by soil texture, stability, hazard of flooding, depth to bedrock, and depth to a seasonal high water table. Corrosivity of the soils is rated in table 5.

Soil features that affect the application of practices that control water are also given in table 6. These practices include use of dikes or levees, farm ponds, agricultural drainage, diversions, and waterways. The features that affect these practices are evaluated on the basis of estimates given in table 5, on test data for some of the soils, and on field experience and observations.

Farm pond reservoir areas are affected by hazard of flooding, rate of seepage or permeability of the underlying material, and depth to bedrock.

Dikes, levees, and embankments are affected by the stability, compactibility, and permeability of the embankment material. Depth to bedrock in a burrow area is also considered.

Agricultural drainage practices are affected by natural drainage, permeability, depth to compact layers and bedrock, and availability of drainage outlets.

Irrigation is affected by infiltration characteristics, available moisture capacity, natural drainage, relief, and soil depth.

Terraces or diversions and waterways are affected by relief, erodibility of the soil, depth to bedrock, and permeability.

The degree and kinds of limitations of soils for additional uses, including homesites, sewage effluent disposal systems, recreation activities, and sanitary land fills, are given in the section "Town and Country Planning."

Town and Country Planning

Montgomery County lies around three sides of the large metropolitan area of Dayton. The rural-fringe areas of Dayton are rapidly expanding into Montgomery County, and there is a corresponding shrinkage of farmlands. The western tier of townships in the county is still mostly rural, but the pressures of nonfarm uses are reflected in the increased number of tracts 5 to 10 acres in size that are occupied by families whose principal jobs are in the city.

About 18 percent of the county is mapped in complexes that include Urban land. The total Urban land in the county, however, is more than that included in the complexes, because Urban land complexes are mapped only in areas where it is difficult to map individual soils. Dayton and its suburbs constitute the largest single block of Urban land in the county.

The expansion of nonfarm uses of land can remove many acres from farming in a short time. Freeways and superhighways can displace up to about 50 acres per mile.

A shopping center can easily replace 50 to 100 acres of farmland. These uses tend to permanently remove land from farm use.

The rapid suburban expansion has emphasized soil-related problems that builders must deal with. For example, some of the soils have severe limitations for use as septic tank disposal fields, some are shallow to hard limestone bedrock, some are underlain by a porous substratum and are droughty, some are easily eroded, and a few soils have no serious limitations. Two of the most serious concerns in community development are the limitations of the soils for septic tank disposal fields and the erosion hazard.

Improperly functioning septic tank systems are a threat to health in areas where the soils have severe limitations for this use. Erosion losses in developing areas are commonly much higher than on comparable farmland, particularly during periods of construction. Erosion control practices, therefore, become very important in areas undergoing development. Specific erosion control practices for use in rural-fringe areas have been developed by the Soil Conservation Service. City officials and developers interested in these practices can obtain information about them from the office of the Montgomery Soil and Water Conservation District.

Community planners and industrial users of land generally look for areas where the soils are least costly to develop. This section of the soil survey provides information on the properties of the soils and their effect on selected rural-fringe uses of the land. This information can be useful for overall planning of land use.

Comparisons can be made among the soils in the county for specific considerations. Individuals and groups concerned with planning can obtain other useful information from the soil maps and in other parts of this soil survey. Table 7 in this section gives the estimated degrees and kinds of limitation of soils for some selected land uses. Thus, alternatives can be developed as a basis for long-range planning and zoning. It must be recognized that extensive manipulation of the soils alters some of their natural properties. In areas where there has been extensive cutting and filling operations, therefore, the ratings for some uses no longer apply.

Any one particular soil property may impose a degree of limitation for a specified land use. This same soil property can be more or less limiting when considering some other specified land use. Therefore, to provide a comparative scale, the estimated degree of limitation for each soil and specified land use is rated *slight*, *moderate*, or *severe*. A rating of *slight* indicates that the soil presents no important limitation to the specified use. A rating of *moderate* shows that the soil presents some limitations to the specified use. These limitations need to be recognized, but they can be overcome or corrected. A rating of *severe* indicates that the soil presents serious problems to the specific use that are difficult and costly to overcome because, in many instances, soil maintenance is a continuing problem. A rating of severe does not mean that the soil cannot be used for the specific use. The limitation is more restrictive for a specified use than a slight or moderate rating for the same use.

Farming.—In table 7 the limitations of the soils for farming have been rated. The ratings are for cultivated crops. The estimated degree of limitation is based on the limitations of the soils when used for row crops, including slope, erosion, wetness, and droughtiness.

Farming is rated in this table to aid land-use planners when they consider alternative uses of the land. In many places farming is as sound a land use as highways or buildings, and it contributes to the quality of the environment. Readers interested in farming should refer to the section "Management of Crops and Pasture."

Onsite disposal of sewage effluent.—Soil properties important to the installation and operation of septic tank disposal fields include permeability, depth to rock, slopes, natural drainage, water table level, and flooding hazard. Use of a soil for the disposal of effluent may be severely limited by flooding, by very poor natural drainage, or by moderately slow to very slow permeability. The permeability of each soil in the county has been estimated and is shown in table 5.

If filter fields for septic tanks are on slopes, erosion and seepage downslope can be hazards or the soil may be unstable when saturated. A severe limitation is imposed by a restrictive layer, such as solid bedrock, a dense compact layer, or a layer of clay that interferes with adequate filtration and the movement of the effluent through the soil.

Some soils in the county have a gravelly and sandy substratum or are underlain by creviced bedrock through which inadequately filtered effluent contaminates ground water or nearby springs, lakes, or streams.

Before a septic tank system is installed, an investigation should be made at the proposed site to determine the limitations of the soil and other related site factors.

Sewage lagoons.—Sewage lagoons are shallow ponds built to dispose of sewage through oxidation. They may be needed in an area if installation of a septic tank or a central sewage system is not feasible. Among the features that determine the degree of limitation are the hazard of flooding, degree of slope, depth to rock, and permeability. Restrictions imposed by local authorities on the use of sewage lagoons are not considered in evaluations. All sewage disposal systems should conform to State and local public health regulations.

Homesite locations.—The ratings for homesite locations apply to homes of three stories or less that have a basement, but the ratings also apply to sites for small industrial, commercial, and institutional buildings.

Most of the acreage taken from farming is being converted to new residential developments. The areas generally are adjacent to towns and cities. In addition, individual houses or small groups of houses are being built throughout the county. By referring to the soil maps and table 7, a prospective developer can determine the major kinds of soil limitations, if any, that are present at a given site.

Soil properties and some related site characteristics that are used for estimating the ratings include depth to bedrock, slope, natural drainage, compressibility, hazard of flooding, and surface stoniness or rockiness. The method of sewage disposal is not considered in the homesite location column. The soils are rated for disposal of sewage effluent from septic tanks in an adjacent column.

TABLE 6.—*Engineering*

[Borrow pits (Bo); Gravel pits (Gp), Made land (Mb), Quarries (Qu), Riverwash (Rh), and Urban land (Ua, Ug, Um) are not rated in The soils in such mapping units may have different properties and limitations, and for this reason it is necessary

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting—
			Topsoil	Sand and gravel	Road fill [1]	Highway location
Algiers: Ag	Poor: seasonally wet; subject to flooding.	High	Good: seasonally wet.	Unsuitable	Poor: moderately fine textured.	Soft when wet; nearly level; hazard of flooding and ponding.
Brookston: Bp, Br, Bs, Bu	Poor: seasonally wet; moderately fine textured.	High	Fair: high organic-matter content; moderately fine textured surface layer.	Unsuitable	Poor: moderately fine textured material. Fair in substratum: loamy material.	Moderately fine textured material; seasonal wetness; moderately slow permeability; ponding.
Carlisle: Ca	Unsuitable: organic soil.	High	Poor in upper 3½ to 5 feet: organic soil; good if mixed with mineral soil.	Unsuitable	Unsuitable: organic material. Poor in substratum: clayey material.	High water table; organic soil; unstable; subject to subsidence if drained; soft and compressible.
Celina [3]: CeA, CeB, CeB2, ClB.	Poor: moderately fine textured subsoil; generally wet in winter.	Moderate	Fair to a depth of 14 inches.	Unsuitable	Poor: moderately fine textured subsoil. Fair in substratum: loamy material.	Moderately good drainage; moderately fine textured subsoil; local boulders, mostly in ClB.
Corwin: CoA, CoB	Poor: moderately fine textured subsoil.	Moderate	Good in upper 12 inches: high organic-matter content.	Unsuitable	Poor: moderately fine textured subsoil. Fair in substratum: loamy material.	Somewhat poor drainage; seasonal high water table; moderately fine textured subsoil.
*Crosby [3]: CsA, CtB, Cu. For Celina part of CtB, see Celina series.	Poor: moderately fine textured subsoil; somewhat poor drainage.	High	Fair to depth of 14 inches.	Unsuitable	Poor: moderately fine textured subsoil. Fair in substratum: loamy material.	Somewhat poor drainage; seasonal high water table; moderately fine textured subsoil.
Dana: DaB	Poor: moderately fine textured subsoil.	Moderate to high.	Good in upper 12 inches: high organic-matter content.	Unsuitable	Poor: moderately fine textured subsoil. Fair in substratum: loamy material.	Moderately good drainage; moderately fine textured subsoil.

See footnotes at end of table.

interpretations

this table. An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. to follow carefully the instructions for referring to other series that appear in the first column of this table]

Soil features affecting—Continued						
Pipeline construction [2] and maintenance	Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
	Reservoir area	Dikes, levees, or embankments				
Seasonal wetness; hazard of flooding, ponding, and caving	Subject to flooding; slow seepage.	Medium compressibility; poor to fair compaction and stability; possibility of piping; seasonal wetness.	Somewhat poor natural drainage; hazard of flooding.	Moderately slow permeability; somewhat poor drainage.	Nearly level; seasonal wetness; hazard of flooding.	Seasonal wetness; hazard of flooding.
Seasonal wetness; moderately fine textured material.	Very slow seepage; seasonal high water table.	Fair to poor compaction and stability; low permeability; medium to high compressibility.	Moderate permeability in upper 36 inches; very poor drainage.	Moderately slow permeability; very poor drainage.	Nearly level; seasonal wetness.	Seasonal wetness; very poor drainage.
Unstable muck; high water table.	Very high organic-matter content; moderately rapid seepage in muck part; high water table.	Unstable; deep organic material; high water table.	High water table; unstable base for tile; some outlet problems.	Rapid infiltration; high available moisture capacity.	Nearly level; organic soil.	High water table; organic soil; nearly level.
Local boulders; moderately good drainage; substratum is compact loamy glacial till.	Slow seepage----	Fair stability and compaction; low permeability; medium compressibility.	Moderately good drainage; moderately slow permeability.	Moderately slow permeability; medium available moisture capacity.	Nearly level to sloping; moderately erodible.	Moderate erosion hazard.
Moderately good drainage; substratum is compact loamy glacial till.	Slow seepage----	Fair stability and compaction; low permeability; medium compressibility.	Moderately good drainage; moderately slow permeability.	Moderately slow permeability; medium available moisture capacity.	Nearly level to gently sloping; moderately erodible.	Moderately susceptible to erosion.
Seasonal high water table; moderately fine textured subsoil; substratum is compact glacial till.	Slow seepage; seasonal high water table.	Fair to good stability; fair compaction; low permeability; medium to high compressibility.	Moderately slow permeability; somewhat poor drainage.	Moderately slow permeability; somewhat poor drainage.	Nearly level to gently sloping; seasonal high water table.	Somewhat poor drainage.
Substratum is compact loamy till; moderately good drainage.	Slow seepage----	Fair to good stability and compaction; medium compressibility; low permeability.	Moderately good drainage; moderately slow permeability.	Moderately slow permeability; high available moisture capacity.	Nearly level to gently sloping; moderately erodible.	Moderately susceptible to erosion.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Sand and gravel	Road fill [1]	Soil features affecting— Highway location
Fairmount: FaE2, FaF2	Poor: clayey subsoil; steep slopes.	Moderate	Poor: thin suitable material.	Unsuitable	Poor: clayey subsoil; limestone and shale bedrock within 20 inches of the surface.	Bedrock within 20 inches of the surface; steep slopes.
Fincastle: FcA	Poor: somewhat poor drainage; moderately fine textured subsoil.	High	Good to depth of about 20 inches.	Unsuitable	Poor: moderately fine textured subsoil. Fair in substratum: loamy material.	Somewhat poor drainage; seasonal high water table.
Fox: FkA, FkB, FlA, FlB, FlC2, FmA, FmB, FmC2, FmD2, FsC3, FuB, FuC, FuF.	Fair to good: moderately fine textured subsoil; gravelly substratum; well drained.	Low	Fair: limited suitable material.	Good below depth of 24 to 42 inches; well-graded calcareous sand and gravel.	Poor: moderately fine textured subsoil. Good in substratum: sand and gravel.	Well drained; cut slopes are droughty.
*Hennepin: HeE2, HeF2, HmF3. For Miamian part, see Miamian series.	Poor: moderately steep to very steep slopes.	Moderate to low.	Poor to fair: limited suitable material.	Unsuitable	Fair: thin, moderately fine textured subsoil. Fair in substratum: loamy material.	Well drained; cut slopes are droughty; rapid runoff; steep slopes.
Kendallville: KeA, KeB, KeC2.	Poor: moderately fine textured subsoil.	Moderate to low.	Fair: limited suitable material.	Unsuitable	Fair to poor: moderately fine textured subsoil. Fair in substratum: loamy material.	Well drained; some sand and gravel pockets in upper 40 inches.
Landes: Ld	Fair to good: susceptible to flooding.	Low	Fair: sandy material.	Good below depth of 40 inches in major stream valleys; poor along minor streams.	Fair to good: sandy material. Good in substratum: sand and gravel.	Well drained; subject to flooding.
Lanier: Lg	Fair to good: subject to flooding.	Low	Fair: sandy material.	Good within depth of 20 to 40 inches in major stream valleys; poor along minor streams.	Good	Well drained; subject to flooding.

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued						
Pipeline construction [2] and maintenance	Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
	Reservoir area	Dikes, levees, or embankments				
Limestone and shale within 20 inches of the surface; steep slopes.	Steep slopes; shallow to bedrock.	Very small amount of material; steep slopes.	Good drainage; artificial drainage not needed.	Steep slopes; low available moisture capacity.	Steep; shallow to bedrock; erodible.	Steep; shallow to bedrock; droughty; erodible.
Moderately fine textured subsoil; substratum is compact glacial till.	Slow seepage; seasonal high water table.	Fair to good stability and compaction; low permeability; medium compressibility; subject to piping.	Moderately slow permeability; somewhat poor drainage.	Moderately slow permeability; somewhat poor drainage.	Nearly level to gently sloping; moderately erodible on slopes.	Moderately susceptible to erosion on slopes.
Sand and gravel substratum within a depth of 40 inches; well drained.	Excessive seepage.	Pervious substratum within depth of 40 inches; fair to good stability and compaction.	Good drainage; artificial drainage not needed.	Moderate infiltration rate; medium to low available moisture capacity.	Nearly level to moderately steep; rapid permeability in the substratum; moderately susceptible to erosion.	Nearly level to moderately steep; moderately erodible on slopes; droughty.
Steep slopes; substratum is compact glacial till.	Steep slopes; slow seepage in till substratum.	Steep slopes; fair stability and compaction; low permeability; medium compressibility.	Good drainage; artificial drainage not needed; steep slopes.	Moderately steep to very steep slopes; low available moisture capacity.	Steep; moderately slow permeability; erodible.	Erodible; steep; droughty.
Well drained; some sand and gravel pockets; substratum is compact till.	Generally slow seepage; local areas of rapidly permeable material.	Fair stability and fair to good compaction; low permeability; medium compressibility.	Good drainage; artificial drainage not needed; steep slopes.	Moderate permeability in the upper 20 to 40 inches; medium available moisture capacity.	Nearly level to sloping; moderately erodible.	Moderately susceptible to erosion.
Sandy soil material; subject to flooding.	Subject to flooding and excessive seepage.	Fair to good compaction and stability; permeable material.	Good drainage; artificial drainage not needed.	Rapid permeability; nearly level; good drainage.	Nearly level; subject to flooding.	Nearly level; subject to flooding.
Sandy and gravelly material; subject to flooding.	Subject to flooding and excessive seepage.	Fair to good compaction and stability; permeable material.	Good drainage; artificial drainage not needed.	Subject to flooding; nearly level; well drained; very low available moisture capacity.	Nearly level; subject to flooding.	Nearly level; subject to flooding; droughty.

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TABLE 6.—*Engineering*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Sand and gravel	Road fill [1]	Soil features affecting— Highway location
Lewisburg: LsB	Poor: seasonal wetness; clayey subsoil.	High	Poor: limited suitable material.	Unsuitable	Poor: clayey subsoil. Fair in substratum: loamy glacial till.	Moderately well drained; seasonal high water table; moderately slow permeability.
*Lorenzo: LxC2, LxD2. For Rodman part, see Rodman series.	Good: well drained; gravelly.	Low	Fair: limited suitable material; high organic-matter content.	Good: calcareous sand and gravel within depth of 24 inches.	Good: sandy and gravelly material.	Well drained; gravelly; cut slopes are droughty.
Medway: Md	Poor: seasonally wet; subject to flooding.	Moderate to high.	Good: seasonally wet.	Locally good in major stream valleys below depth of 60 inches; poor along tributary streams.	Fair: loamy material; locally, the substratum is good.	Seasonal high water table; subject to flooding.
Miamian [3]: MlA, MlB, MlB2, MlC2, MlD2, MmB, MnB3, MnC3, MnD3, MoB, MoC, MoE.	Poor: clay loam to clay subsoil.	Moderate	Fair: limited suitable material.	Unsuitable	Fair to poor: clay loam to clay subsoil. Fair in substratum: loamy material.	Well drained; some moderately steep slopes; boulders locally.
Millsdale: MrA	Poor: very poor drainage; moderately fine textured to fine textured subsoil.	High	Fair to good: moderately fine textured surface layer; high organic-matter content.	Unsuitable: limestone at depth of 20 to 40 inches.	Poor: moderately fine textured to fine textured subsoil; limestone at depth of 20 to 40 inches.	Very poor drainage; limestone at depth of 20 to 40 inches.
Milton: MsA, MsB, MsB2, MsC2, MsD2, MtD3, MuB, MuC, MuD.	Fair to poor: moderately fine textured subsoil; good drainage.	Moderate	Fair: limited suitable material.	Unsuitable: limestone at depth of 20 to 40 inches.	Poor: moderately fine textured subsoil; limestone at depth of 20 to 40 inches.	Limestone at depth of 20 to 40 inches; good drainage.
Montgomery: Mv	Poor: poor drainage; moderately fine textured and fine textured material.	High	Fair: moderately fine textured surface layer; high organic-matter content.	Unsuitable	Poor: moderately fine textured and fine textured subsoil and substratum; seasonally wet.	Very poor drainage; subject to ponding.

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued						
Pipeline construction [2] and maintenance	Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
	Reservoir area	Dikes, levees, or embankments				
Moderately well drained clayey subsoil; substratum is compact loam glacial till.	Slow seepage----	Fair stability; good compaction; low permeability; medium to high compressibility.	Moderately well drained; compact till at a depth of 12 to 18 inches.	Moderately slow permeability; low to medium available moisture capacity.	Nearly level to sloping; moderately erodible.	Moderately susceptible to erosion; droughty in cut channels.
Sandy and gravelly material; well drained.	Excessive seepage.	Pervious material; good stability.	Good drainage; artificial drainage not needed.	Rapid infiltration; very low available moisture capacity.	Well drained; erodible.	Susceptible to erosion; droughty.
Subject to flooding; unstable ditch walls; moderately well drained.	Subject to flooding; moderate seepage.	Fair to good compaction and stability; medium compressibility; possibility of piping.	Moderate permeability; moderately good drainage.	Moderate permeability; subject to flooding; high available moisture capacity.	Nearly level; subject to flooding.	Nearly level; subject to flooding.
Well drained; compact loam glacial till.	Slow seepage; some moderately steep slopes.	Fair to good stability and compaction; low permeability; medium to high compressibility.	Good drainage; artificial drainage not needed.	Moderately slow permeability; medium available moisture capacity.	Nearly level to moderately steep; moderately erodible.	Moderately susceptible to erosion; droughty on eroded soils.
Very poor drainage; limestone at depth of 20 to 40 inches.	Limestone at depth of 20 to 40 inches; may be fractured.	Poor stability and compaction; limestone at depth of 20 to 40 inches.	Very poor drainage; limestone at depth of 20 to 40 inches.	Moderately slow permeability; very poor drainage.	Nearly level; very poor drainage.	Very poor drainage; channels are likely to be clayey.
Limestone at depth of 20 to 40 inches; good drainage.	Limestone at depth of 20 to 40 inches; may be fractured.	Fair stability and compaction; low permeability; medium compressibility; bedrock at depth of 20 to 40 inches.	Good drainage; artificial drainage not needed.	Moderately slow permeability; medium available moisture capacity.	Nearly level to moderately steep; moderately erodible; limestone at depth of 20 to 40 inches.	Moderately erodible; cut channels are droughty; limestone at depth of 20 to 40 inches.
Very poor drainage; moderately fine textured and fine textured soil.	Very low seepage; seasonal high water table.	Poor compaction and stability; cracks when dry; low permeability; high compressibility.	Very poor drainage; slow to very slow permeability; some local outlet problems.	Relief nearly level; slow to very slow permeability; high available moisture capacity.	Nearly level; poor drainage.	Nearly level; poor drainage.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Sand and gravel	Road fill [1]	Soil features affecting— Highway location
Ockley: OcA, OcB	Fair to good: moderately fine textured subsoil; good drainage.	Moderate	Good	Good for sand and gravel below depth of 42 to 60 inches; well graded; calcareous sand and gravel.	Poor: moderately fine textured subsoil. Good in substratum.	Good drainage; no limiting features.
Plattville: PlB, PlC	Fair to poor: moderately fine textured subsoil; good drainage.	Moderate	Good to depth of 12 inches; high organic-matter content.	Unsuitable: limestone at depth of 20 to 40 inches.	Poor: moderately fine textured subsoil; limestone at depth of 20 to 40 inches.	Limestone at depth of 20 to 40 inches; good drainage.
Pyrmont: PyA	Poor: seasonally wet, moderately fine textured and fine textured subsoil.	High	Fair: limited suitable material.	Unsuitable	Poor: moderately fine textured and fine textured subsoil. Fair in substratum: loamy glacial till.	Somewhat poor drainage; seasonal high water table.
Randolph: RcA	Poor: clayey subsoil; seasonally wet.	High	Fair: limited suitable material.	Unsuitable: limestone at depth of 20 to 40 inches.	Poor: clayey subsoil; limestone at depth of 20 to 40 inches.	Somewhat poor drainage; limestone at depth of 20 to 40 inches.
Ritchey: ReB, ReB2, ReC2, ReE2, ReF2, RfD3.	Poor: moderately fine textured subsoil.	Moderate	Poor: thin suitable material.	Unsuitable: limestone at depth of 10 to 20 inches.	Poor: thin, moderately fine textured material over limestone at depth of 10 to 20 inches.	Limestone at depth of 10 to 20 inches; some very steep slopes.
*Rodman: RlE2, RlF2 For Fox part, see the Fox series.	Good: good drainage.	Low	Poor: thin gravelly material.	Good: well-graded calcareous sand and gravel below depth of 10 inches.	Good: well-drained gravelly material.	Steep and very steep slopes; good drainage; stable material.

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued						
Pipeline construction [2] and maintenance	Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
	Reservoir area	Dikes, levees, or embankments				
Good drainage; sand and gravel substratum.	Excessive seepage in substratum.	Fair to good stability and compaction; permeable material in substratum.	Good drainage; artificial drainage not needed.	Moderate permeability; high available moisture capacity.	Nearly level to gently sloping; moderately erodible on slopes.	Moderately susceptible to erosion.
Good drainage; limestone at depth of 20 to 40 inches.	Limestone at depth of 20 to 40 inches; may be fractured.	Fair stability and compaction; low permeability; medium compressibility; bedrock at depth of 20 to 40 inches.	Good drainage; artificial drainage not needed.	Moderately slow permeability; medium available moisture capacity.	Nearly level to sloping; moderately erodible; limestone at depth of 20 to 40 inches.	Moderately erodible; limestone at depth of 20 to 40 inches; cut channels are droughty.
Substratum is dense compact glacial till; somewhat poor drainage.	Slow seepage	Fair to poor stability and compaction; low permeability; medium to high compressibility.	Somewhat poor drainage; compact till at depth of 12 to 18 inches; moderately slow to slow permeability.	Moderately slow to slow permeability; somewhat poor drainage.	Nearly level; seasonally wet.	Nearly level; seasonally wet; cut channels are droughty.
Somewhat poor drainage; limestone at depth of 20 to 40 inches.	Slow seepage; limestone at depth of 20 to 40 inches; fractured.	Fair to poor stability and compaction; low permeability; high compressibility.	Limestone at depth of 20 to 40 inches; moderately slow permeability.	Moderately slow permeability; somewhat poor drainage.	Nearly level; somewhat poor drainage.	Nearly level; somewhat poor drainage; cut channels are clayey and difficult to vegetate.
Limestone at depth of 10 to 20 inches; some very steep slopes.	Limestone at depth of 10 to 20 inches.	Commonly not used; thin soil material over limestone.	Not needed; shallow; good drainage.	Moderately slow permeability; very low available moisture capacity.	Nearly level to very steep; erodible; shallow to bedrock.	Nearly level to very steep; erodible; shallow to bedrock; droughty.
Steep and very steep slopes; good drainage; sand and gravel substratum.	Pervious material; high seepage losses.	Commonly not used; thin soil material over pervious sand and gravel.	Good drainage; artificial drainage not needed.	Very low available moisture capacity.	Steep or very steep; shallow to sand and gravel; erodible.	Steep or very steep; shallow to sand and gravel; erodible.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Sand and gravel	Road fill [1]	Soil features affecting— Highway location
Ross: Rs, Rt	Poor: loamy material; subject to flooding.	Moderate	Good	Locally, good in major stream valleys below depth of 60 inches; poor along tributary streams.	Fair: loamy material. Fair to good in substratum.	Subject to flooding; nearly level.
*Russell: RuB, RvC2, RvD2. For Miamian part of RvC2 and RvD2, see the Miamian series.	Poor: moderately fine textured subsoil.	Moderate	Good	Unsuitable	Fair to poor: moderately fine textured subsoil. Fair in substratum: loamy glacial till.	Well drained; loamy; some moderately steep slopes; erosive on cuts and fills.
Shoals: Sh	Poor: seasonally wet; loamy material.	High	Good	Unsuitable	Poor: soft, loamy soil; seasonally wet.	Somewhat poor drainage; subject to flooding; soft when wet.
Sloan: So	Poor: seasonally wet; soft, loamy soil.	High	Good	Unsuitable	Poor: soft, loamy soil; subject to flooding.	Very poor drainage; subject to flooding; soft and compressible.
Thackery, till substratum: ThA.	Fair to poor: moderately fine textured subsoil; seasonally wet for short periods.	Moderate to high.	Good	Poor to unsuitable: thin sand and gravel over till.	Fair to poor: moderately fine textured subsoil. Fair in substratum: loamy glacial till.	Nearly level; moderately good drainage.
Tippecanoe: TpA	Fair to poor: seasonally wet for short periods; moderately fine textured subsoil.	Moderate to high.	Good	Good below depth of 40 to 60 inches; well-graded calcareous sand and gravel.	Fair to poor: moderately fine textured subsoil. Good in substratum.	Nearly level; moderately good drainage.

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued						
Pipeline construction [2] and maintenance	Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
	Reservoir area	Dikes, levees, or embankments				
Subject to flooding; nearly level.	Subject to flooding; excessive seepage in some areas; subject to caving.	Fair stability and compaction; moderate permeability; low compressibility; possibility of piping.	Good drainage; artificial drainage not needed.	Moderate permeability; high available moisture capacity.	Nearly level; subject to flooding.	Nearly level; subject to flooding.
Well drained; loamy; substratum is compact till.	Slow seepage	Fair stability and compaction; low permeability; medium compressibility; subject to piping.	Good drainage; artificial drainage not needed.	Moderate permeability in upper 2 feet; high available moisture capacity.	Gently sloping to moderately steep; erodible on slopes.	Moderately to highly susceptible to erosion.
Somewhat poor drainage; subject to flooding; soft when wet.	Somewhat poor drainage; subject to flooding and caving.	Subject to flooding; possible excessive seepage in substratum.	Fair compaction and stability; low permeability; medium to high compressibility; subject to flooding.	Somewhat poor drainage; moderately slow permeability; subject to flooding.	Nearly level; subject to flooding.	Nearly level; subject to flooding.
Very poor drainage; subject to flooding and caving.	Subject to flooding; excessive seep-in substratum.	Fair compaction and stability; low permeability; medium to high compressibility; subject to piping.	Very poor drainage; moderately slow permeability; some outlet problems locally.	Moderately slow permeability; very poor drainage; subject to flooding.	Nearly level; seasonally wet; subject to flooding.	Nearly level; seasonally wet; subject to flooding.
Loamy outwash material over compact glacial till; moderately good drainage.	Excessive seepage in upper 5 feet.	Good compaction and stability; moderate to low permeability; medium compressibility.	Moderately good drainage; moderate permeability.	Moderate permeability; moderately good drainage.	Nearly level; moderately good drainage.	No limiting features.
Loamy outwash over sand and gravel at a depth of 40 to 60 inches; seasonal high water table.	Excessive seepage in substratum.	Good compaction and stability; moderate to low permeability; medium compressibility.	Moderately good drainage; moderate permeability.	Moderate permeability; moderately good drainage.	Nearly level; moderately good drainage.	No limiting features.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Suitability as source of— Sand and gravel	Suitability as source of— Road fill [1]	Soil features affecting— Highway location
Warsaw: WaA, WaB	Fair to good: moderately fine textured subsoil; gravelly substratum; good drainage.	Low	Fair to good: limited suitable material; high organic-matter content.	Good below depth of 24 to 42 inches; well-graded calcareous sand and gravel.	Fair to poor: moderately fine textured subsoil. Good in substratum.	Good drainage; cut slopes are droughty.
Wea: WeA, WeB	Fair to good: moderately fine textured subsoil; good drainage.	Moderate	Good	Good for sand and gravel below depth of 42 to 60 inches; well-graded calcareous sand and gravel.	Fair: moderately fine textured subsoil. Good in substratum.	Good drainage; no limiting features.
Westland: Ws	Poor: very poor drainage; moderately fine textured subsoil.	High	Good	Fair to good below depth of 40 to 70 inches; well-graded calcareous sand and gravel; locally sand and gravel with some silt.	Poor: moderately fine textured subsoil. Good in substratum.	Very poor drainage; seasonal high water table; nearly level.
Wynn: WyB2	Poor to fair: moderately fine textured subsoil; good drainage.	Moderate	Fair to good: limited suitable material.	Unsuitable: limestone at depth of 20 to 40 inches.	Fair to poor: moderately fine textured subsoil; limestone at depth of 20 to 40 inches.	Limestone at depth of 20 to 40 inches; good drainage.
Xenia: XeA, XeB	Poor: moderately fine textured subsoil; moderately good drainage.	Moderate	Good to depth of about 14 inches.	Unsuitable	Poor: moderately fine textured subsoil; substratum fair: compact loamy glacial till.	Moderately good drainage; no limiting features.

[1] Substratum within 60 inches rated separately if different from soil rating.
[2] Corrosion potential is rated in table 5.

interpretations—Continued

Soil features affecting—Continued						
Pipeline construction [2] and maintenance	Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
	Reservoir area	Dikes, levees, or embankments				
Sand and gravel substratum within a depth of 20 to 40 inches; well-drained soil.	Excessive seepage.	Pervious substratum within a depth of 40 inches; fair to good stability.	Good drainage; artificial drainage not needed.	Good infiltration; medium to low available moisture capacity.	Nearly level to gently sloping; moderate permeability.	Nearly level to gently sloping; moderately erodible; droughty.
Good drainage; sand and gravel substratum.	Excessive seepage in substratum.	Fair to good compaction and stability; permeable material in substratum.	Good drainage; artificial drainage not needed.	Moderate permeability; medium to high available moisture capacity.	Nearly level to gently sloping; moderately erodible on slopes.	Moderately susceptible to erosion.
Very poor drainage; sand and gravel substratum.	Most places have excessive seepage in substratum; seasonal high water table.	Fair to good compaction and stability; permeable material in substratum; medium compressibility; low permeability; seasonally wet.	Very poor drainage; seasonal high water table; moderately slow permeability.	Moderately slow permeability; high available moisture capacity.	Nearly level; very poor drainage.	Very poor drainage; seasonally wet.
Limestone at depth of 20 to 40 inches; good drainage.	Limestone at depth of 20 to 40 inches; limestone fractured in places.	Fair stability and compaction; low permeability; medium compressibility; limited depth to limestone.	Good drainage; artificial drainage not needed.	Moderately slow permeability; medium available moisture capacity.	Gently sloping; moderately erodible.	Moderately erodible; cut channels are droughty.
Moderately good drainage; substratum is compact till.	Slow seepage	Fair stability; good to fair compaction; low permeability; medium compressibility.	Moderately good drainage; moderately slow permeability.	Moderately slow permeability; high available moisture capacity.	Nearly level to gently sloping; moderately erodible on slopes.	Moderately erodible; moderately good drainage.

[2] Where these soils occur on the glacial boulder belt, earth moving and trenching may be hampered by boulders in the soil and in the underlying material.

TABLE 7.—*Estimated degree and kinds of limitations*

[Borrow pits (Bo), Gravel pits (Gp), Made land (Mb), Quarries (Qu), and Riverwash (Rh) are so variable that limitations are not esti- two or more kinds of soil. The soils in such mapping units may have different properties and limitations, and for this reason

Soil series and map symbols	Farming	Onsite disposal of sewage effluent	Sewage lagoons	Homesite location [1] (3 stories or less)	Lawns, landscaping, golf fairways
Algiers: Ag	Slight: subject to flooding.	Severe: subject to flooding or ponding; moderately slow permeability.	Severe: subject to flooding or ponding.	Severe: subject to flooding or ponding.	Severe: subject to flooding; seasonal high water table.
Brookston: Bp, Br, Bs, Bu.	Slight	Severe: seasonal high water table; subject to ponding; moderately slow permeability.	Slight	Severe: very poorly drained.	Severe: very poorly drained.
Carlisle: Ca	Moderate: high water table.	Severe: high water table.	Severe: organic soil.	Severe: very poorly drained; soft and unstable.	Severe: very poorly drained.
Celina:					
CeA	Slight	Severe: moderately slow permeability.	Slight	Slight	Slight
CeB, CeB2, ClB.	Slight	Severe: moderately slow permeability; ClB is bouldery.	Moderate: slope; ClB is bouldery.	Slight except for ClB: moderate for ClB: boulders.	Slight
Corwin:					
CoA	Slight	Severe: moderately slow permeability.	Slight	Slight	Slight
CoB	Slight	Severe: moderately slow permeability.	Moderate: slope	Slight	Slight
Crosby:					
CsA, Cu	CsA: slight; Cu not rated.	Severe: moderately slow permeability.	Slight	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.
*CtB. For Celina part of this mapping unit, see Celina series.	Slight	Severe: moderately slow permeability.	Moderate: slope	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.

See footnotes at end of table.

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mated. Onsite investigation is needed. An asterisk in the first column indicates that at least one mapping unit in this series is made up of it is necessary to follow carefully the instructions for referring to other series that appear in the first column of this table]

Streets and parking lots	Recreation				Sanitary land fill (trench method)	Cemeteries
	Athletic fields	Parks and play areas	Campsites			
			Tents	Trailers		
Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.
Severe: very poorly drained; soft and unstable.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.
Slight	Moderate: moderately slow permeability.	Slight	Moderate: moderately slow permeability.	Moderate: moderately slow permeability.	Slight	Moderate: moderately well drained; moderately slow permeability.
Moderate: slope; ClB is bouldery.	Moderate: moderately slow permeability; slope; ClB is bouldery.	Slight	Moderate: moderately slow permeability.	Moderate: moderately slow permeability; slope.	Slight: ClB is bouldery.	Moderate: moderately well drained; moderately slow permeability; ClB is bouldery.
Slight	Moderate: moderately slow permeability.	Slight	Moderate: moderately slow permeability.	Moderate: moderately slow permeability.	Slight	Moderate: moderately well drained; moderately slow permeability.
Moderate: slope	Moderate: moderately slow permeability; slope.	Slight	Moderate: moderately slow permeability.	Moderate: moderately slow permeability; slope.	Slight	Moderate: moderately well drained; moderately slow permeability.
Moderate: seasonal high water table; somewhat poorly drained.	Moderate: moderately slow permeability; somewhat poorly drained.	Moderate: poorly drained.	Moderate: moderately slow permeability; somewhat poorly drained.	Moderate: moderately slow permeability; somewhat poorly drained.	Moderate: somewhat poorly drained.	Severe: somewhat poorly drained.
Moderate: seasonal high water table.	Moderate: moderately slow permeability; somewhat poorly drained; slope.	Moderate: somewhat poorly drained.	Moderate: moderately slow permeability; somewhat poorly drained.	Moderate: moderately slow permeability; somewhat poorly drained; slope.	Moderate: somewhat poorly drained.	Severe: somewhat poorly drained.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Farming	Onsite disposal of sewage effluent	Sewage lagoons	Homesite location [1] (3 stories or less)	Lawns, landscaping, golf fairways
Dana: DaB	Slight	Severe: moderately slow permeability.	Moderate: slope	Slight	Slight
Fairmount: FaE2, FaF2.	Severe: slope	Severe: shallow to bedrock; slope; moderately slow permeability.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.
Fincastle: FcA	Slight	Severe: moderately slow permeability.	Slight	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.
Fox:					
FkA, FlA, FmA.	Slight	Slight [2]	Severe: [2] too permeable.	Slight	Slight to moderate: droughty.
FkB, FlB, FmB, FuB.	Slight	Slight [2]	Severe: [2] too permeable.	Slight	Slight to moderate: droughty.
FlC2, FmC2, FsC3, FuC.	Moderate: slope and erosion hazard.	Moderate: [2] slope	Severe: [2] too permeable; slope.	Moderate: slope	Moderate: slope; droughty; severe for FsC3.
FmD2, FuF	Severe: slope and erosion hazard.	Severe: [2] slope	Severe: [2] too permeable; slope.	Severe: slope	Severe: slope; droughty.
Hennepin and Miamian: HeE2, HeF2, HmF3.	Severe: slope and erosion.	Severe: slope; moderately slow permeability.	Severe: slope	Severe: slope	Severe: slope
Kendallville:					
KeA	Slight	Severe: moderately slow permeability.	Moderate: moderately permeable in upper layers.	Slight	Slight
KeB	Slight	Severe: moderately slow permeability.	Moderate: moderately permeable in upper layers; slope.	Slight	Slight
KeC2	Moderate: slope and erosion hazard.	Severe: moderately slow permeability; slope.	Severe: slope	Moderate: slope	Moderate: slope; severe where severely eroded.
Landes: Ld	Slight: subject to flooding.	Severe: [2] subject to flooding.	Severe: [2] subject to flooding; pervious subsoil.	Severe: subject to flooding.	Severe: subject to flooding.
Lanier: Lg	Slight: subject to flooding.	Severe: [2] subject to flooding.	Severe: [2] subject to flooding; pervious subsoil.	Severe: subject to flooding.	Severe: subject to flooding.
Lewisburg: LsB	Slight	Severe: moderately slow permeability.	Moderate: slope	Slight	Slight

See footnotes at end of table.

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Streets and parking lots	Recreation				Sanitary land fill (trench method)	Cemeteries
	Athletic fields	Parks and play areas	Campsites			
			Tents	Trailers		
Moderate: slope.	Moderate: moderately slow permeability; slope.	Slight	Moderate: moderately slow permeability.	Moderate: moderately slow permeability; slope.	Slight	Moderate: moderately slow permeability; moderately well drained.
Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.
Moderate: seasonal high water table; slope.	Moderate: moderately slow permeability; somewhat poorly drained; slope.	Moderate: poorly drained.	Moderate: moderately slow permeability; somewhat poorly drained.	Moderate: moderately slow permeability; somewhat poorly drained.	Moderate: somewhat poorly drained.	Severe: somewhat poorly drained.
Slight	Slight: moderate if gravelly.	Slight	Slight	Slight	Severe:[2] too permeable.	Slight.
Moderate: slope.	Moderate: slope; gravelly in some places.	Slight	Slight	Moderate: slope.	Severe:[2] too permeable.	Slight.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Severe: slope	Severe:[2] too permeable.	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe:[2] too permeable; slope.	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Slight	Slight	Slight	Slight	Slight	Slight.
Moderate: slope.	Moderate: slope.	Slight	Slight	Moderate: slope.	Slight	Slight.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Severe: slope	Moderate: slope.	Moderate: slope.
Severe: subject to flooding.	Moderate:[3] subject to flooding.	Moderate:[3] subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Severe: subject to flooding.	Moderate:[3] subject to flooding.	Moderate:[3] subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Moderate: slope.	Moderate: slope; moderately slow permeability.	Slight	Slight to moderate: moderately slow permeability.	Moderate: slope; moderately slow permeability.	Slight	Moderate: moderately well drained.

TABLE 7.—*Estimated degree and kinds of limitation*

Soil series and map symbols	Farming	Onsite disposal of sewage effluent	Sewage lagoons	Homesite location [1] (3 stories or less)	Lawns, landscaping, gol fairways
Lorenzo-Rodman:					
LxC2	Severe: slope and erosion hazard.	Moderate: [2] slope	Severe: rapid permeability.	Moderate: slope	Moderate: slope; droughty.
LxD2	Severe: slope and erosion hazard.	Severe: [2] slope	Severe: rapid permeability; slope.	Severe: slope	Severe: slope
Medway: Md	Slight: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Miamian:					
MlA	Slight	Severe: moderately slow permeability.	Slight	Slight	Slight
MlB, MlB2, MmB, MnB3, MoB.	Slight: erosion; moderate on MnB3; MoB not rated.	Severe: moderately slow permeability.	Moderate: slope	Slight	Slight: moderate on MnB3; erosion.
MlC2, MnC3, MoC.	Moderate: slope and erosion; MoC not rated; severe on MnC3: slope and erosion.	Severe: moderately slow permeability.	Severe: slope	Moderate: slope	Moderate: severe on MnC3; erosion.
MlD2, MnD3, MoE.	Severe: slope and erosion hazard; MoE not rated.	Severe: moderately slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope and erosion.
Millsdale: MrA	Moderate: seasonal high water table.	Severe: very poorly drained; 1½ to 3½ feet to bedrock; moderately slow permeability.	Severe: less than 3 feet to bedrock in some places.	Severe: very poorly drained; less than 3 feet to bedrock in places.	Severe: very poorly drained.
Milton:					
MsA	Slight	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Moderate: 1½ to 3½ feet to bedrock.
MsB, MsB2, MuB.	Slight	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Moderate: 1½ to 3½ feet to bedrock; severe erosion in some places.
MsC2, MuC	Moderate: slope and erosion.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Moderate: 1½ to 3½ feet to bedrock; slope.
MsD2, MtD3, MuD.	Severe: slope and erosion.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock; slope.	Severe: 1½ to 3½ feet to bedrock; slope.	Severe: 1½ to 3½ feet to bedrock; slope.
Montgomery: Mv	Moderate: seasonally wet.	Severe: very poorly drained; slowly permeable.	Slight	Severe: very poorly drained.	Severe: very poorly drained.
Ockley:					
OcA	Slight	Slight [2]	Severe: [2] pervious substratum.	Slight	Slight
OcB	Slight	Slight [2]	Severe: [2] pervious substratum.	Slight	Slight

See footnotes at end of table.

of soils for town and country planning—Continued

Streets and parking lots	Recreation				Sanitary land fill (trench method)	Cemeteries
	Athletic fields	Parks and play areas	Campsites			
			Tents	Trailers		
Severe: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: too permeable.	Moderate: slope.
Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Severe: slope.	Severe: too permeable.	Severe: slope.
Severe: subject to flooding.	Moderate:[3] subject to flooding.	Moderate:[3] subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Slight.	Moderate: moderately slow permeability.	Slight.	Moderate: moderately slow permeability.	Moderate: moderately slow permeability.	Slight.	Moderate: moderately slow permeability.
Moderate: slope.	Moderate: moderately slow permeability; slope.	Slight.	Moderate: moderately slow permeability.	Moderate: slope; moderately slow permeability.	Slight.	Moderate: moderately slow permeability; slope.
Severe: slope.	Severe: slope.	Moderate: slope.	Moderate: moderately slow permeability.	Severe: slope.	Moderate: slope.	Moderate: moderately slow permeability; slope.
Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained; 1½ to 3½ feet to bedrock.	Severe: very poorly drained; 1½ to 3½ feet to bedrock.
Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Moderate: 1½ to 3½ feet to bedrock.	Moderate: moderately slow permeability.	Moderate: moderately slow permeability.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.
Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Moderate: 1½ to 3½ feet to bedrock.	Moderate: moderately slow permeability.	Moderate: slope; moderately slow permeability.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.
Severe: 1½ to 3½ feet to bedrock; slope.	Severe: 1½ to 3½ feet to bedrock; slope.	Moderate: 1½ 3½ feet to bedrock; slope.	Moderate: slope.	Severe: slope.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.
Severe: 1½ to 3½ feet to bedrock; slope.	Severe: 1½ to 3½ feet to bedrock; slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.
Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.
Slight.	Slight.	Slight.	Slight.	Slight.	Severe: pervious substratum.	Slight.
Moderate: slope.	Moderate: slope.	Slight.	Slight.	Moderate: slope.	Severe: pervious substratum.	Slight.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Farming	Onsite disposal of sewage effluent	Sewage lagoons	Homesite location [1] (3 stories or less)	Lawns, landscaping, golf fairways
Plattville:					
PlB	Slight	Severe: 1½ to 3½ feet to bedrock; moderately slow permeability.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Moderate: 1½ to 3½ feet to bedrock.
PlC	Moderate: slope and erosion hazard.	Severe: 1½ to 3½ feet to bedrock; slope.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock; slope.	Moderate: 1½ to 3½ feet to bedrock; slope.
Pyrmont: PyA	Slight	Severe: moderately slow to slow permeability.	Slight	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.
Randolph: RcA	Moderate: seasonal high water table.	Severe: 1½ to 3½ feet to bedrock; moderately slow permeability.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Moderate: 1½ to 3½ feet to bedrock; somewhat poorly drained.
Ritchey:					
ReB, ReB2	Moderate: erosion hazard.	Severe: shallow to bedrock.	Severe: shallow to bedrock.	Severe: shallow to bedrock.	Severe: shallow to bedrock.
ReC2, ReE2, ReF2, RfD3.	Severe: slope and erosion hazard.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.
*Rodman: RlE2, RlF2. Mapped with Fox soils; rating applies to both soils.	Severe: slope and erosion hazard.	Severe: slope	Severe: slope and rapid permeability in substrata.	Severe: slope	Severe: slope; droughty.
Ross: Rs, Rt	Slight: Rt not rated.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Russell: RuB	Slight	Severe: moderately slow permeability.	Moderate: slope	Slight	Slight
Russell-Miamian:					
RvC2	Moderate: slope and erosion hazard.	Severe: moderately slow permeability; slope.	Severe: slope	Moderate: slope	Moderate: slope
RvD2	Severe: slope and erosion hazard.	Severe: moderately slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope
Shoals: Sh	Slight: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.

See footnotes at end of table.

of soils for town and country planning—Continued

Streets and parking lots	Recreation				Sanitary land fill (trench method)	Cemeteries
	Athletic fields	Parks and play areas	Campsites			
			Tents	Trailers		
Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Moderate: 1½ 3½ feet to bedrock.	Moderate: moderately slow permeability.	Moderate: slope; moderately slow permeability.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.
Severe: 1½ to 3½ feet to bedrock; slope.	Severe: 1½ to 3½ feet to bedrock; slope.	Moderate: 1½ to 3½ feet to bedrock; slope.	Moderate: slope.	Severe: slope.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.
Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained; moderately slow to slow permeability.	Moderate: somewhat poorly drained; moderately slow to slow permeability.	Moderate: somewhat poorly drained.	Severe: somewhat poorly drained.
Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Moderate: 1½ to 3½ feet to bedrock; somewhat poorly drained.	Moderate: somewhat poorly drained; moderately slow permeability.	Moderate: somewhat poorly drained; moderately slow permeability.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock; somewhat poorly drained.
Severe: shallow to bedrock.	Severe: shallow to bedrock.	Severe: shallow to bedrock.	Severe: shallow to bedrock.	Severe: shallow to bedrock.	Severe: shallow to bedrock.	Severe: shallow to bedrock.
Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.
Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope; rapid permeability in subsoil.	Severe: slope.
Severe: subject to flooding.	Moderate:[3] subject to flooding.	Moderate:[3] subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Moderate: slope.	Moderate: moderately slow permeability.	Slight.	Moderate: moderately slow permeability.	Moderate: slope; moderately slow permeability.	Slight.	Moderate: moderately slow permeability.
Severe: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope; moderately slow permeability.
Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Severe: subject to flooding.	Moderate to severe:[3] subject to flooding.	Moderate:[3] subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Farming	Onsite disposal of sewage effluent	Sewage lagoons	Homesite location [1] (3 stories or less)	Lawns, landscaping, golf fairways
Sloan: So	Moderate: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Thackery, till substratum: ThA.	Slight	Slight	Moderate: moderate permeability in the upper 4 feet.	Slight	Slight
Tippecanoe: TpA	Slight	Slight [2]	Severe: permeable substratum.	Slight	Slight
Urban land:					
Ua	Not rated	Severe:[2] subject to flooding.	Severe:[2] subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Ug	Not rated	Slight [2]	Severe:[2] too permeable.	Slight	Slight
Um	Not rated	Severe: moderately slow permeability.	Moderate: slope	Slight	Slight
Warsaw:					
WaA	Slight	Slight [2]	Severe:[2] permeable substratum.	Slight	Slight
WaB	Slight	Slight [2]	Severe:[2] permeable substratum.	Slight	Slight: droughty
Wea:					
WeA	Slight	Slight [2]	Severe:[2] too permeable.	Slight	Slight
WeB	Slight	Slight [2]	Severe:[2] too permeable.	Slight	Slight
Westland: Ws	Slight	Severe:[2] very poorly drained.	Severe:[2] permeable substratum.	Severe: very poorly drained.	Severe: very poorly drained.
Wynn: WyB2	Slight	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Moderate: 1½ to 3½ feet to bedrock.
Xenia:					
XeA	Slight	Severe: moderately slow permeability.	Slight	Slight	Slight
XeB	Slight	Severe: moderately slow permeability.	Moderate: slope	Slight	Slight

[1] Includes small industrial, institutional, and commercial buildings having 3 stories or less and basement.
[2] Pollution hazard to nearby streams, lakes, and springs because of inadequate filtration.

of soils for town and country planning—Continued

Streets and parking lots	Recreation: Athletic fields	Recreation: Parks and play areas	Recreation: Campsites: Tents	Recreation: Campsites: Trailers	Sanitary land fill (trench method)	Cemeteries
Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Slight	Slight	Slight	Slight	Slight	Moderate: permeable strata above a depth of 4 feet.	Slight.
Slight	Slight	Slight	Slight	Slight	Severe:[2] permeable substratum.	Slight.
Severe: subject to flooding.	Severe:[3] subject to flooding.	Moderate:[3] subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Slight	Slight	Slight	Slight	Slight	Severe:[2] too permeable.	Slight.
Moderate: slope	Moderate: slope; moderately slow permeability.	Slight	Moderate: moderately slow permeability.	Moderate: slope; moderately slow permeability.	Slight	Moderate: moderately slow permeability.
Slight	Slight	Slight	Slight	Slight	Severe:[2] too permeable.	Slight.
Moderate: slope	Moderate: slope.	Slight	Slight	Moderate: slope.	Severe:[2] too permeable.	Slight.
Slight	Slight	Slight	Slight	Slight	Severe:[2] too permeable.	Slight.
Moderate: slope	Moderate: slope.	Slight	Slight	Moderate: slope.	Severe:[2] too permeable.	Slight.
Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.
Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.	Moderate: 1½ to 3½ feet to bedrock.	Slight	Moderate: slope.	Severe: 1½ to 3½ feet to bedrock.	Severe: 1½ to 3½ feet to bedrock.
Slight	Moderate: moderately slow permeability.	Slight	Moderate: moderately slow permeability.	Moderate: moderately slow permeability.	Slight	Slight.
Moderate: slope	Moderate: slope; moderately slow permeability.	Slight	Moderate: moderately slow permeability.	Moderate: slope; moderately slow permeability.	Slight	Slight.

[3] Actual rating is dependent upon onsite evaluation of duration and frequency of flooding.

Soils subject to flooding have severe limitations for permanently used structures. Although flooding may be infrequent, it is costly and damaging when it does occur. Homes on naturally wet soils may have wet basements if adequate drainage is not provided. The Brookston, Westland, Crosby, and Fincastle are among the soils in this county having a wetness hazard. In about 28 percent of the county, wetness is a severe hazard. In many areas in the county, well-developed systems of tile and open ditches have been provided for farm drainage. In wet areas excavations for houses and similar structures can disrupt an established drainage system and change the area back to its natural condition of wetness.

Soils such as those of the Montgomery series have a high clay content. These soils are not so favorable for supporting structural foundations as are the Fox and other coarser textured soils. Unless special precautions are taken, soils having high shrink-swell properties are likely to cause cracks in foundations. Also, high shrink-swell properties affect the alinement of sidewalks, patios, floors, and rock walls. To minimize this effect, a subgrade or layers of sandy or gravelly material directly below the structure are desirable.

Excavation of basements and installation of underground utility lines are difficult and expensive in soils that are shallow to bedrock. In addition to the erosion hazard on sloping soils, excavation and leveling are difficult.

Lawns, landscaping, and golf fairways.—Some of the soils in the county are suitable sources of topsoil, as shown in table 6. During construction, soil suitable as topsoil can be scalped and pushed aside into a stockpile. After grading has been completed, the topsoil can be distributed back over the area so as to provide a good root zone for lawns, flowers, shrubs, and trees. The natural surface layer in areas being developed for streets can be scalped in a like manner and used to improve adjacent areas where it is most needed.

Among the soil properties that determine whether a good lawn or golf fairway can be established are natural drainage, slope, depth to bedrock, texture of the surface soil, stoniness and rockiness, hazard of flooding, permeability, and the available moisture capacity.

Streets and parking lots.—This column rates the use of soils for streets and parking lots in subdivisions. The ratings apply to streets and parking lots that do not have continuous heavy traffic. Soil characteristics that affect this use include drainage, slope, depth to rock, flooding hazard, and stoniness or rockiness. Tables 5 and 6 give other information about the soils that are important for streets and parking lots. The percentage of slope suitable for the sides of cuts and fills depends on the erodibility of the soil and its capacity to support close-growing plants.

Recreation.—Recreation is becoming more important in the county as the population increases and people have more leisure time. Most of the soils in the county are suitable for some kind of recreational development. The soils on flood plains generally occur in long winding areas along streams and adjacent hillsides. In many communities the flood plains are within easy reach of much of the population. Such scenic areas can be developed as community parks and picnic areas if the local flood hazard is recognized and evaluated. In such areas used for parks and picnic areas, the property is generally relatively undeveloped and property losses are low during periods of flooding. Some of the soils on flood plains have few limitations for athletic fields, but property losses may be high during periods of flooding. Soils subject to flooding have limitations for campsites because of the hazard to human life. The hazard to human life is less in community parks and athletic fields because they are less likely to be used during rainy periods than are campsites.

Athletic fields and other intensive play areas are fairly small tracts used for baseball, football, tennis, volleyball, badminton, and other sports. Because the areas must be nearly level, considerable shaping may be needed. Slope, therefore, is a limitation for these uses. Permeability and natural drainage are important because most athletic fields are drained artificially to provide a stable playing surface.

Parks and play areas can be located on many kinds of soil. Areas consisting of several different kinds of soil provide a variety of wildlife and natural vegetation, including that suitable for wildlife. Considered in rating the soils for picnicing, hiking, nature study, and similar uses are degree of slope, texture of the surface soil, natural drainage, stoniness, and the hazard of flooding. Paths in picnic and play areas should be constructed and maintained in a way that helps to control gullying.

Campsites should be located in areas where the landscape is attractive, the trafficability is good, and the productivity of grasses and trees is medium or high. They should be situated so that the hazards to human life are relatively low. Soils that have good or moderately good natural drainage are less seriously limited than wetter soils. Where slopes increase, limitations generally increase more for trailer campsites than for tent campsites. Soils that are firm when moist and nonsticky when wet are desirable for both kinds of campsites. Among the soils most suitable for campsites are those having a surface layer that provides good trafficability. A fine-textured surface layer is sticky when wet and therefore less suited to foot or vehicle traffic. Bouldery soils have some limitations for campsites unless some of the boulders are removed.

Sanitary land fill.—In considering the use of soils for sanitary land fills, the depth to underlying rock is especially important. The most favorable soils for trench-type sanitary land fills are those that are deep, well drained, and slowly permeable. Among the features that limit use are shallowness to bedrock, adverse soil texture, wetness, rapid permeability, steep slopes, and flooding.

Cemeteries.—For use as cemeteries, soils that are deep, are well drained or moderately well drained, and have slopes of less than 12 percent are better suited than other soils. Steeper soils have severe limitations, and so do soils that are somewhat poorly drained to very poorly drained or that are affected by a seasonal high water table. If the water table is permanently lowered, limitations are only slight or moderate on some soils. The use of soils for cemeteries is severely limited by hard bedrock near the surface. At all periods of the year, excavation is easier in the sandier soils. Shoring the sides of excavations is

necessary if caving is likely. Saving the original surface layer so that it can be used as the top layer of backfill is important, though lime and fertilizer are generally needed for maintaining sod.

Utility lines.—The installation and maintenance of utility lines are affected by soil properties, though the limitations of the soils for this use are not rated in table 7. Utilities are affected mainly by depth to bedrock, natural drainage, the water table, and corrosion potential. All the soils in the county have been rated for corrosion potential in table 5. Soil features affecting pipeline construction and maintenance are given in table 6. The soil descriptions point out other properties important to installation and maintenance of utility lines. During the planning stages, selecting a route for utility lines can be facilitated by use of this soil survey. The establishment, control, and maintenance of vegetation on utility rights-of-way are also related to soil properties.

Descriptions of the Soils

This section describes the soil series and the mapping units in Montgomery County. The procedure is first to describe each soil series, and then the mapping units in that series. Thus, to get full information on any one mapping unit, it is necessary to read both the description of that unit and the description of the soil series to which it belongs.

Each soil series contains two descriptions of a soil profile. The first is brief and in terms familiar to a layman. The second, detailed and in technical terms, is for scientists, engineers, and others who need to make thorough and precise studies of soils. Terms used in the technical descriptions are standard and are defined in the Soil Survey Manual (*14*). Colors are for moist soil unless otherwise noted.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Gravel pits and Made land, for example, do not belong to a series but, nevertheless, are listed in alphabetic order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit in which the mapping unit has been placed. The page on which each capability unit is described can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 8. Many terms used in describing soils can be found in the Glossary at the end of this survey.

TABLE 8.—*Acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Algiers silt loam	216	(1)
Borrow pits	521	0.2
Brookston silt loam	8,572	2.9
Brookston silt loam, overwash	865	.3
Brookston silty clay loam	33,200	10.0
Brookston-Urban land complex	1,117	.4
Carlisle muck	51	(1)
Celina silt loam, 0 to 2 percent slopes	7,725	2.7
Celina silt loam, 2 to 6 percent slopes	28,980	9.6
Celina silt loam, 2 to 6 percent slopes, moderately eroded	1,622	.6
Celina bouldery silt loam, 2 to 6 percent slopes	142	(1)
Corwin silt loam, 0 to 2 percent slopes	511	.2
Corwin silt loam, 2 to 6 percent slopes	2,199	.8
Crosby silt loam, 0 to 2 percent slopes	18,626	6.0
Crosby-Celina silt loams, 2 to 6 percent slopes	1,625	.6
Crosby-Urban land complex	5,982	2.0
Dana silt loam, 2 to 6 percent slopes	853	.3
Fairmount silty clay loam, 12 to 25 percent slopes, moderately eroded	236	(1)
Fairmount silty clay loam, 25 to 50 percent slopes, moderately eroded	233	(1)
Fincastle silt loam, 0 to 4 percent slopes	2,365	.8
Fox sandy loam, 0 to 2 percent slopes	691	.2
Fox sandy loam, 2 to 6 percent slopes	219	(1)
Fox loam, 0 to 2 percent slopes	703	.3
Fox loam, 2 to 6 percent slopes	559	.2
Fox loam, 6 to 12 percent slopes, moderately eroded	160	(1)
Fox silt loam, 0 to 2 percent slopes	2,600	.9
Fox silt loam, 2 to 6 percent slopes	2,670	.9
Fox silt loam, 6 to 12 percent slopes, moderately eroded	594	.2
Fox silt loam, 12 to 18 percent slopes, moderately eroded	310	.1
Fox soils, 6 to 12 percent slopes, severely eroded	98	(1)
Fox-Urban land complex, gently sloping	12,156	4.2
Fox-Urban land complex, rolling	834	.3
Fox-Urban land complex, steep	194	(1)
Gravel pits	1,165	.4
Hennepin and Miamian silt loams, 18 to 25 percent slopes, moderately eroded	2,599	.9
Hennepin and Miamian silt loams, 25 to 50 percent slopes, moderately eroded	2,155	.8
Hennepin and Miamian soils, 18 to 50 percent slopes, severely eroded	1,368	.5
Kendallville silt loam, 0 to 2 percent slopes	143	(1)
Kendallville silt loam, 2 to 6 percent slopes	176	(1)
Kendallville silt loam, 6 to 12 percent slopes, moderately eroded	91	(1)
Landes sandy loam	701	.3
Lanier sandy loam	348	.1
Lewisburg silt loam, 2 to 6 percent slopes	299	.1
Lorenzo-Rodman complex, 4 to 12 percent slopes, moderately eroded	135	(1)
Lorenzo-Rodman complex, 12 to 18 percent slopes, moderately eroded	105	(1)
Made land	1,697	.6
Medway silt loam	3,698	1.2
Miamian silt loam, 0 to 2 percent slopes	1,956	.7
Miamian silt loam, 2 to 6 percent slopes	23,426	8.3
Miamian silt loam, 2 to 6 percent slopes, moderately eroded	21,841	7.4
Miamian silt loam, 6 to 12 percent slopes, moderately eroded	9,413	3.2
Miamian silt loam, 12 to 18 percent slopes, moderately eroded	2,067	.7
Miamian bouldery silt loam, 2 to 6 percent slopes	200	(1)

See footnote at end of table.

TABLE 8.—*Acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Miamian clay loam, 2 to 6 percent slopes, severely eroded	513	.2	Ritchey silty clay loam, 6 to 18 percent slopes, severely eroded	106	(1)
Miamian clay loam, 6 to 12 percent slopes, severely eroded	6,216	2.1	Riverwash	258	(1)
Miamian clay loam, 12 to 18 percent slopes, severely eroded	2,641	.9	Rodman and Fox soils, 18 to 25 percent slopes, moderately eroded	403	.2
Miamian-Urban land complex, undulating	21,506	7.0	Rodman and Fox soils, 25 to 50 percent slopes, moderately eroded	302	.1
Miamian-Urban land complex, rolling	3,718	1.3	Ross silt loam	10,731	3.4
Miamian-Urban land complex, steep	1,248	.4	Ross-Urban land complex	3,786	1.2
Millsdale silty clay loam, 0 to 3 percent slopes	1,082	.4	Russell silt loam, 2 to 6 percent slopes	3,953	1.3
Milton silt loam, 0 to 2 percent slopes	1,030	.3	Russell-Miamian silt loams, 6 to 12 percent slopes, moderately eroded	489	.2
Milton silt loam, 2 to 6 percent slopes	2,265	.8	Russell-Miamian silt loams, 12 to 18 percent slopes, moderately eroded	116	(1)
Milton silt loam, 2 to 6 percent slopes, moderately eroded	1,887	.6	Shoals silt loam	101	(1)
Milton silt loam, 6 to 12 percent slopes, moderately eroded	1,230	.4	Sloan silt loam	953	.3
Milton silt loam, 12 to 18 percent slopes, moderately eroded	157	(1)	Thackery silt loam, till substratum, 0 to 2 percent slopes	145	(1)
Milton silty clay loam, 6 to 18 percent slopes, severely eroded	510	.2	Tippecanoe silt loam, 0 to 2 percent slopes	134	(1)
Milton-Urban land complex, undulating	947	.3	Urban land, alluvial	738	.3
Milton-Urban land complex, rolling	441	.2	Urban land, gravelly material	186	(1)
Milton-Urban land complex, hilly	67	(1)	Urban land, loamy material	74	(1)
Montgomery silty clay loam	643	.2	Warsaw silt loam, 0 to 2 percent slopes	408	.2
Ockley silt loam, 0 to 2 percent slopes	1,418	.5	Warsaw silt loam, 2 to 6 percent slopes	75	(1)
Ockley silt loam, 2 to 6 percent slopes	464	.2	Wea silt loam, 0 to 2 percent slopes	1,424	.5
Plattville silt loam, 2 to 6 percent slopes	490	.2	Wea silt loam, 2 to 6 percent slopes	179	(1)
Plattville silt loam, 6 to 12 percent slopes	107	(1)	Westland silty clay loam	898	.3
Pyrmont silt loam, 0 to 2 percent slopes	185	(1)	Wynn silt loam, 2 to 6 percent slopes, moderately eroded	199	(1)
Quarries	203	(1)	Xenia silt loam, 0 to 2 percent slopes	1,224	.4
Randolph silt loam, 0 to 2 percent slopes	664	.3	Xenia silt loam, 2 to 6 percent slopes	3,836	1.3
Ritchey silt loam, 2 to 6 percent slopes	271	(1)	Dams	70	(1)
Ritchey silt loam, 2 to 6 percent slopes, moderately eroded	192	(1)	Interstate highways	2,196	.8
Ritchey silt loam, 6 to 12 percent slopes, moderately eroded	458	.2	Water areas 3 to 40 acres in size and streams less than one-eighth of a mile wide	2,233	.8
Ritchey silt loam, 12 to 25 percent slopes, moderately eroded	445	.2	Total	297,600	100.0
Ritchey silt loam, 25 to 50 percent slopes, moderately eroded	373	.1			

1 Less than 0.1 percent.

Algiers Series

The Algiers series consists of nearly level, somewhat poorly drained soils that occur on flood plains along small streams and on alluvial fans along the valley walls of larger streams. These soils consist of light-colored recent alluvium over a buried soil, which is dark-colored, very poorly drained alluvium.

A representative profile of an Algiers soil has a plow layer that is dark grayish-brown silt loam about 8 inches thick. Between depths of 8 and 15 inches is a layer of brown silt loam. Both layers lack mottles or other evidence of wetness. Between depths of 15 and 42 inches are layers of very dark gray silt loam and silty clay loam that are mottled with gray and grayish brown. The mottles and the gray colors indicate seasonal wetness. Below a depth of 42 inches is dark-gray silty clay loam that is faintly mottled with yellowish brown.

Algiers soils have moderately slow permeability, a high available moisture capacity, and a seasonal high water table. They are subject to periodic flooding. They have a deep root zone when the water table is low. They are mostly neutral to mildly alkaline; in places the surface layer is slightly acid.

If well managed, these soils are well suited to row crops. Winter grains occasionally are flooded in areas not protected from overflow. Most areas of these soils are cultivated. Some areas are in pasture. The main crops are corn, oats, soybeans, and grass-legume meadow.

Representative profile of Algiers silt loam, SE¼SW¼ sec. 32, T. 5 N., R. 5 E.; Randolph Township:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

C—8 to 15 inches, brown (10YR 4/3) silt loam; weak, medium, subangular blocky structure; friable; dark grayish-brown (10YR 4/2) organic stains on ped surfaces; neutral; gradual, smooth boundary.

IIA11b—15 to 20 inches, very dark gray (10YR 3/1) and dark grayish-brown (10YR 4/2) silt loam; moderate, medium, subangular blocky structure; friable; neutral; abrupt, smooth boundary.

IIA12bg—20 to 32 inches, very dark gray (10YR 3/1) heavy silt loam; few, fine, faint, gray (10YR 5/1) and grayish-brown (10YR 5/2) mottles; moderate, medium, subangular blocky structure; friable; slightly calcareous; clear, smooth boundary.

IIB2bg—32 to 42 inches, very dark gray (10YR 3/1) silty clay loam; few, fine, faint, gray (10YR 5/1) mottles; weak, medium, subangular blocky structure; firm; mildly alkaline, calcareous; clear, smooth boundary.

IICbg—42 to 60 inches, dark-gray (10YR 4/1) silty clay loam; few, fine, faint, yellowish-brown (10YR 5/4 and 5/6) mottles; massive; firm; mildly alkaline and calcareous.

The A and C horizons are 14 to 30 inches thick and are dark grayish-brown, brown, very dark gray, and dark grayish-brown silt loam. The Ap horizon is most commonly dark grayish brown (10YR 4/2). The C horizon is brown (10YR 4/3) or dark grayish brown (10YR 4/2).

The Ap and C horizons are slightly acid to neutral. Deeper layers are neutral to mildly alkaline and become calcareous with increasing depth. The buried soil horizons vary in thickness and texture, but their texture is mostly silty clay loam or heavy silt loam.

Algiers soils are adjacent to Sloan, Westland, Ross, and Medway soils. They have a lighter colored surface layer than any of these soils. They are more poorly drained than Medway and Ross soils and are better drained than Sloan and Westland soils. They have thicker layers of recent deposition than Brookston silt loam, overwash, which is on uplands.

Algiers silt loam (Ag).—This soil is nearly level and occupies narrow flood plains of small streams throughout the county. In some places it occupies small fan-shaped areas where recent alluvium has washed onto larger flood plains. This soil tends to crust. It dries slowly in spring, but it can be drained by tile if outlets can be established. Surface runoff is slow, and ponding is a hazard in low areas.

Included in mapping are small areas of the wetter, dark-colored Westland and Sloan soils.

Seasonal soil wetness and flooding are the major limitations of this soil for farming. Flooding is a limitation for most nonfarm uses. Some areas are flooded so that they are better suited to grass, trees or other permanent vegetation than to crops. (Capability unit IIw–1)

Borrow Pits

Borrow pits (Bo) are made up of excavated areas from which soil material has been removed to be used as fill for highway or other construction. As a result, the original soil profiles have been altered in some places, and in most areas little soil material from the original profile remains. Some of the pits have a recreation potential, particularly those that can hold water. Pits that are not ponded generally are very droughty. Material at the surface is commonly calcareous glacial till or other underlying material. (Capability unit not assigned)

Brookston Series

The Brookston series consists of dark, very poorly drained soils that formed in calcareous loam glacial till. Brookston soils are nearly level to depressional and occupy areas on uplands. They are the dominant soils in the northwestern part of the county, and they are common in all townships of the county.

A representative profile has a very dark grayish-brown silty clay loam plow layer 8 inches thick. Very dark gray silty clay loam is between depths of 8 and 12 inches. The subsoil extends to a depth of 36 inches. It is silty clay loam and is mostly dark gray and gray mottled with yellowish brown. Below a depth of about 36 inches is calcareous, mottled gray and yellowish-brown loam glacial till.

Brookston soils have a well-developed structure and moderate permeability within the uppermost 24 to 36 inches. Permeability in the underlying glacial till is moderately slow. As a result, Brookston soils are generally saturated in winter and spring. Organic-matter content and the available moisture capacity are high. These soils are mostly neutral in the root zone but with depth increase in alkalinity to moderately alkaline.

Brookston soils are well suited to cultivated crops if management is optimum. They have a high water table during prolonged wet periods, but they are drained well by using tile. These soils should be drained for the best growth of most crops. Most areas of Brookston soils are drained and cultivated. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow. Some areas are woodland, especially those not artificially drained.

Representative profile of Brookston silty clay loam, NE¼NE¼ sec. 11, T. 6 N., R. 4 E., 830 feet west of Pansing Road and 1,080 feet south of Phillipsburg Road; Clay Township:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, fine, subangular blocky structure; firm; neutral; abrupt, smooth boundary.

A1—8 to 12 inches, very dark gray (10YR 3/1) silty clay loam that has few, fine, faint, dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/4) mottles; strong, fine, angular and subangular blocky structure; firm; neutral; clear, smooth boundary.

B1tg—12 to 17 inches, dark-gray (10YR 4/1) silty clay loam that has common, fine, faint, yellowish-brown (10YR 5/6) mottles and few, fine, faint, dark yellowish-brown (10YR 4/4) mottles; strong, fine and medium, subangular blocky structure; firm; thin, patchy, very dark gray (10YR 3/1) clay films on ped faces; neutral; clear, smooth boundary.

B21tg—17 to 22 inches, dark-gray (10YR 4/1) silty clay loam that has common, fine, faint, yellowish-brown (10YR 5/4 and 5/6) mottles and few, fine, faint, dark yellowish-brown (10YR 4/4) mottles; weak, fine, prismatic structure parting to moderate, medium, subangular blocky structure; firm; thin, patchy, very dark gray (10YR 3/1) clay films on ped surfaces; many black oxide concretions; neutral; clear, smooth boundary.

B22tg—22 to 27 inches, dark-gray (10YR 4/1) silty clay loam that has common, medium, faint, yellowish-brown (10YR 5/4, 5/6, and 5/8) mottles and few, medium, faint, dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; firm; thin, patchy clay films on ped surfaces; many black oxide concretions; neutral; gradual, smooth boundary.

B23g—27 to 32 inches, mottled dark-gray (10YR 4/1), yellowish-brown (10YR 5/4, 5/6, and 5/8), and olive 5Y 5/3) silty clay loam; massive parting along a few weak cleavage planes; firm; mildly alkaline, mildly calcareous; gradual, smooth boundary.

B3g—32 to 36 inches, mottled gray (10YR 5/1), yellowish-brown (10YR 5/4, 5/6, and 5/8), and yellowish-red (5YR 4/6) silty clay loam; massive; firm; moderately alkaline; mildly calcareous; clear, wavy boundary.

Cg—36 to 60 inches, mottled gray (10YR 5/1) and yellowish-brown (10YR 5/4, 5/6, and 5/8) loam till; massive; firm; common till pebbles; moderately alkaline, calcareous.

The A horizon is dominantly silty clay loam but is silt loam in some places. Depth to the mottled A1 horizon ranges

from 6 to 12 inches. The A horizon ranges from 12 to 22 inches in thickness and is medium acid to neutral.

Depth to carbonates is 24 to 40 inches. Depth to calcareous glacial till ranges from 34 to 50 inches. The B2 horizon is slightly acid to mildly alkaline. The B2 horizon ranges from about 32 to 44 percent in clay content. The silt capping is up to 18 inches thick where Brookston soils are adjacent to Celina and Lewisburg soils, but it is 18 to 36 inches thick where Brookston soils are adjacent to Xenia and Fincastle soils. The Brookston soils in Montgomery County tend to have a little more clay in the subsoil than Brookston soils mapped elsewhere.

Brookston soils are adjacent to Fincastle and Xenia soils in the southeastern part of the county, to Pyrmont and Lewisburg soils near the town of Pyrmont, and to Crosby and Celina soils in the rest of the county. Brookston soils are nearly level and depressional where they are intermingled with these slightly higher adjacent soils and are more poorly drained and darker colored. Brookston soils are more poorly drained than the dark-colored Dana soils. The Brookston soils formed in silt-capped glacial till and have relatively little gravel in the underlying layers, but the very poorly drained, dark-colored Westland soils formed in loamy glacial outwash and have a considerable amount of gravel in the deep layers. The subsoil of Brookston soils is silty clay loam, but the very poorly drained Montgomery soils, which formed in sediments on old lake bottoms, have more clay in the subsoil. Brookston soils are underlain by thick glacial till, whereas the very poorly drained Millsdale soils have limestone and clay shale bedrock at a depth of 20 to 40 inches.

Brookston silt loam (Bp).—This nearly level soil occupies small depressions and areas at the heads of waterways, narrow strips along drainageways in rolling areas, and low, level areas on the till plains. This soil has a coarser textured surface layer that contains less clay than that of Brookston silty clay loam and is, therefore, easier to plow. Also, tilth is good through a wider range of moisture content than for Brookston silty clay loam.

Included in mapping are small areas of the somewhat poorly drained Crosby soils along the edges of the soil boundaries and small areas of Brookston silt loam, overwash, in the narrow drainageways. The inclusions of Crosby soils are lighter colored than Brookston silt loam and generally are on the highest parts of the areas mapped. Also included are a few small areas of soils that have a dark surface layer and are somewhat poorly drained.

Seasonal wetness is the major limitation to use of this soil for farming. Seasonal wetness and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIw–2)

Brookston silt loam, overwash (Br).—This nearly level soil is in narrow strips and small oval depressions on the till plains and moraines throughout the county. It has the profile described as representative for the series, except that the surface layer is 6 to 10 inches thick and consists of dark grayish-brown to dark-brown silt loam material that was washed from the surrounding slopes and deposited on the darker surface layer. The structure of this lighter colored surface layer is weakly developed, and the soil materials tend to run together or puddle when rain falls on the bare surface. Ponding is very likely in undrained areas of this soil.

Seasonal wetness is the major limitation of this soil for farming. Seasonal wetness and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIw–2)

Brookston silty clay loam (Bs).—This nearly level soil is in nearly level and depressional areas at the heads of waterways in rolling landscapes and in broad, level stretches on the till plains. It has the profile described as representative for the series. It is the most extensive soil in the county. This soil has a more clayey surface layer than that of the other Brookston soils. It has a narrower range of optimum moisture for tillage than the other Brookston soils and is more likely to clod if worked when wet.

Included in mapping are small areas of light-colored, somewhat poorly drained Crosby soils on slight rises on the till plain and small areas of Brookston silt loam, overwash.

Seasonal wetness is the major limitation to use of this soil for farming. Seasonal wetness and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIw–2)

Brookston-Urban land complex (Bu).—This mapping unit is on the uplands and is underlain by compact loam glacial till. Most areas of this mapping unit have been disturbed or buried by earthmoving or fill operations to the extent that natural soil characteristics have been obliterated and a precise classification cannot be made. Undisturbed areas are dominantly a Brookston soil similar to that described as representative for the series.

Included in mapping are undisturbed areas of Crosby and Fincastle soils.

This mapping unit is dominantly very poorly drained, and seasonal wetness is the major limitation to use. Runoff is generally slow after heavy rains except where increased by artificial drainage, storm sewers, and the like. (Capability unit not assigned)

Carlisle Series

The Carlisle series consists of deep, very poorly drained soils that formed in thick deposits of organic material. These soils are nearly level to depressional and are naturally swampy. Most areas are in the beds of old lakes that existed after the glacial age.

A represenative profile of a Carlisle soil has a black muck surface layer that is very high in organic-matter content. It is about 11 inches thick. Next are layers of black muck that are 15 to 30 percent dark reddish-brown, fibrous, undecomposed organic material. Beneath the organic material, at a depth of about 82 inches, is dark-gray clay.

Through most of the year, Carlisle soils have a high water table unless they are artificially drained. They are high in organic-matter content and available moisture capacity. Permeability is moderately rapid in the muck layers and slow in the underlying clay. Soil reaction is mostly neutral.

If drained, Carlisle soils are well suited to row crops and specialty crops. In this county most areas of these soils have not been drained and are wet and swampy.

Representative profile of Carlisle muck, SE¼NE¼ sec. 20, R. 7, T. 2, 1,780 feet west of Woodman Drive and 3,230 feet north of Patterson Road; city of Kettering:

Oap—0 to 5 inches, black (10YR 2/1) muck; strong, very fine and fine, granular structure; firm; many roots; neutral; clear, smooth boundary.

Oa1—5 to 11 inches, black (10YR 2/1) muck, black (5YR 2/1) when rubbed; strong, medium, subangular blocky structure that parts to strong, fine, subangular blocky structure; firm; many fine specks of dark reddish-brown (2.5YR 3/4), undecomposed organic matter; many roots; many wormcasts; neutral; clear, wavy boundary.

Oa2—11 to 21 inches, black (5YR 2/1) muck; massive except for random horizontal and vertical cleavages; firm and compact; 15 percent dark reddish-brown (5YR 3/4), fibrous, undecomposed organic matter; common roots; neutral; gradual, smooth boundary.

Oa3—21 to 82 inches, black (5YR 2/1) peaty muck; massive; loose; 30 percent dark reddish-brown (5YR 3/4), undecomposed organic matter; few roots; common, black (10YR 2/1), slick, horizontal ped surfaces; neutral.

IICg—82 to 90 inches, dark-gray (5YR 4/1) clay; massive; firm; calcareous.

The surface horizon is black (10YR 2/1) or very dark brown (10YR 2/2). The underlying organic material is black (5YR 2/1 to 10YR 2/1) and contains dark reddish-brown (5YR 3/4) peaty material that increases in volume as depth increases. Depth to clayey mineral material is more than 50 inches.

Carlisle soils differ from all other very poorly drained soils in the county by having formed in organic material in contrast to mineral material.

Carlisle muck (Ca).—This nearly level soil is in depressions on flood plains and terraces. It is adjacent to Ross and Medway soils on the flood plains and to Montgomery soils on the terraces.

Included in mapping are small areas of muck that is thinner than 50 inches and small areas that have a surface layer of mineral overwash up to 12 inches thick.

A water table that stays high for long periods is the major limitation to use of this soil for farm and nonfarm purposes. Even if drained, this soil is subject to oxidation and subsidence unless the water table is controlled. It is subject to soil blowing and fire damage if it is allowed to become too dry. This soil can be readily drained by tile if outlets can be established. (Capability unit IIIw-4)

Celina Series

The Celina series consists of moderately well drained soils formed in calcareous loam glacial till. In some places Celina soils have up to 18 inches of wind-deposited silty material (loess) capping the glacial till material. These soils are nearly level to gently sloping, and they occupy areas of till plains and moraines. They are common in all parts of the county except the southeastern part.

A representative profile has a dark-brown and brown silt loam plow layer about 8 inches thick. Below the plow layer is a thin, yellowish-brown silty clay loam layer. Beneath a depth of 10 inches, the subsoil is dark yellowish-brown silty clay loam, silty clay, and loam. Yellowish-brown mottles are present in the subsoil. Beneath the subsoil, between depths of 30 and 60 inches, is calcareous, olive-brown and dark yellowish-brown loam till. The content of pebbles and coarse fragments in the till varies, but it is generally less than 15 percent.

Celina soils are well suited to crops if management is optimum. The available moisture capacity is medium. These soils have a seasonal high water table for short periods in winter and spring. Permeability is moderately slow. These soils are medium acid to strongly acid in the root zone. Most areas of Celina soil are cultivated. The main crops grown are corn, wheat, oats, soybeans, and grass-legume meadow.

Representative profile of Celina silt loam, 2 to 6 percent slopes, SW¼NW¼ sec. 27, T. 6 N., R. 4 E., 1,655 feet south of Pleasant Plain Road and 615 feet east of State Route 311; Clay Township (Sample MT-4 in laboratory data):

Ap1—0 to 6 inches, dark-brown (10YR 4/3) silt loam; dark grayish-brown (10YR 4/2) when crushed; weak, medium, granular structure; very friable; neutral; clear, smooth boundary.

Ap2—6 to 8 inches, brown (10YR 4/3) silt loam; weak, thick, platy structure parting to weak, fine, subangular blocky structure; very friable; neutral; abrupt, smooth boundary.

IIB&A—8 to 10 inches, yellowish-brown (10YR 5/4) heavy silty clay loam; weak, medium and coarse, subangular blocky structure; friable; vertical faces of peds have thin, very patchy, brown (10YR 4/3) clay films and grayish-brown (10YR 5/2) and light brownish-gray (10YR 6/2) silt coatings; few till pebbles; slightly acid; clear, smooth boundary.

IIB21t—10 to 14 inches, dark yellowish-brown (10YR 4/4) heavy silty clay loam; weak, medium and coarse, subangular blocky structure parting to moderate, fine, subangular blocky structure; firm; both horizontal and vertical faces of peds have moderately thick, patchy, dark-gray (10YR 4/1) and dark grayish-brown (10YR 4/2) clay films and patchy, gray (10YR 5/1) silt coatings; few, medium, faint, black (10YR 2/1) oxide stains; medium acid; clear, wavy boundary.

IIB22t—14 to 19 inches, dark yellowish-brown (10YR 4/4) silty clay that has few, fine, distinct, yellowish-brown (10YR 5/8) and grayish-brown (10YR 5/2) mottles; weak, medium, prismatic structure parting to moderate, medium, subangular blocky structure; firm; moderately thick, patchy, dark gray (10YR 4/1) and very dark gray (10YR 3/1) clay films on both horizontal and vertical faces of the peds; few, medium, faint, black (10YR 2/1) oxide stains and concretions; strongly acid; gradual, smooth boundary.

IIB23t—19 to 24 inches, dark yellowish-brown (10YR 4/4) heavy silty clay loam that has common, fine, faint, grayish-brown (10YR 5/2) mottles and few, medium, distinct, yellowish-brown (10YR 5/8) mottles; weak, medium, prismatic structure parting to moderate, medium, subangular blocky structure; firm; very dark gray (10YR 3/1) clay films that are thick and patchy on vertical surfaces of peds and moderately thick and patchy on horizontal surfaces; few, fine, faint, black (10YR 2/1) oxide concretions; few shale fragments; clear, wavy boundary.

IIB3—24 to 30 inches, dark yellowish-brown (10YR 4/4) heavy loam that has few, fine, faint, grayish-brown (10YR 5/2) mottles and common, medium, distinct, yellowish-brown (10YR 5/8) mottles; massive, parting to weak, very coarse, prismatic structure along clay flows; firm; compact; thick, patchy, very dark gray (10YR 3/1) clay films on the vertical surfaces of peds; neutral; calcareous ped interiors; 13 percent pebbles, mostly limestone; clear, wavy boundary.

IIC1—30 to 41 inches, olive-brown (2.5Y 4/4) loam; massive; firm; mildly alkaline; strongly calcareous; clear, wavy boundary.

IIC2—41 to 60 inches, dark yellowish-brown (10YR 4/4) and olive-brown (2.5Y 4/4) loam; massive; firm and compact; moderately alkaline, strongly calcareous.

The loess ranges from 0 to 18 inches in thickness. Depth to carbonates ranges from 18 to 36 inches. The A horizon is dark grayish brown (10YR 4/2), brown or dark brown (10YR 4/3), or dark gray (10YR 4/1). The B horizon is brown (10YR 4/3), dark yellowish brown (10YR 4/4), or yellowish brown (10YR 5/4). The B2 horizon is heavy clay loam, heavy silty clay loam, and silty clay. Depth to the mottled horizon ranges from 14 to 28 inches. The minimum reaction of the solum is in the B1 horizon, where present, or in the upper part of the B2 horizon. Reaction ranges from strongly acid to slightly acid.

The Celina soils are adjacent to Miamian, Crosby, and Brookston soils. Drainage is not so good in the Celina soils as it is in the Miamian soils, but it is better than the drainage of the Crosby or Brookston soils. Celina soils have a silt capping 0 to 18 inches thick, but the Xenia soils have a silt capping more than 18 inches thick. The Celina soils are 18 to 36 inches deep to carbonates, but the Lewisburg soils are less than 18 inches. The Celina soils are similar to Corwin soils, but they have a lighter colored surface layer.

Celina silt loam, 0 to 2 percent slopes (CeA).—This soil occupies low, smooth ridges on the till plain, low swells between drainageways, and narrow strips along the tops of the steeper slopes where lateral drainage is good.

Included in mapping are small areas of the wetter Crosby and Brookston soils.

This Celina soil dries out more slowly in spring than the other Celina soils because it is nearly level. Surface runoff is slow, and there is little or no hazard of erosion.

Moderately slow permeability is a limitation for some nonfarm uses. (Capability unit I–1)

Celina silt loam, 2 to 6 percent slopes (CeB).—This soil is on low, undulating ridges on the till plains and is downslope from the well-drained Miamian soils in rolling areas. The profile of this soil is the one described as representative for the series. This soil typically has good tilth.

Included in mapping are small areas of Miamian soils on the tops of the undulating ridges and areas of dark-colored, wetter Brookston soils along the small drainageways.

Surface runoff is medium, and an erosion hazard is the major limitation to use of this soil for farming. Slope and moderately slow permeability are limitations for some nonfarm uses. (Capability unit IIe–3)

Celina silt loam, 2 to 6 percent slopes, moderately eroded (CeB2).—This soil is on low, knobby ridges on the till plain and is downslope from the well-drained Miamian soils in rolling areas. It is eroded to the extent that material from the upper part of the subsoil has been mixed into the plow layer by cultivation. The resulting plow layer is stickier than that of uneroded Celina soils and has lower organic-matter content, less favorable tilth, and a narrower range of optimum moisture for tillage.

Included in mapping are small areas of well-drained Miamian soils on the tops of the knobby ridges and adjacent to steeper slopes where lateral drainage is good. Also included are areas that are only slightly eroded.

The hazard of further erosion is the major limitation to the use of this soil for farming. Surface runoff is rapid. Slope and moderately slow permeability are limitations for some nonfarm uses. (Capability unit IIe–3)

Celina bouldery silt loam, 2 to 6 percent slopes (ClB).—This soil is on broad knolls between drainageways and is downslope from the well-drained Miamian soils. The profile of this soil is similar to that described as representative for the series except that many boulders are in the surface layer. The boulders are so numerous that modern equipment cannot be used for row crop tillage until they are removed. More boulders are beneath the surface layer than in other Celina soils.

Included in mapping are small areas of soils that are so eroded that the plow layer is a mixture of the subsoil and original surface layer. Also included are small areas of Miamian soils on the crests of the knolls.

An erosion hazard is the major limitation to the use of this soil for farming. Slope and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIe–3)

Corwin Series

The Corwin series consists of dark-colored, moderately well drained soils that formed in calcareous loam glacial till. In places these soils have a silt cap of loess as much as 18 inches thick. They are nearly level to gently sloping and occupy upland areas. These soils occur in all parts of the county except the southeastern part.

A representative profile has a very dark grayish-brown silt loam plow layer about 6 inches thick. The next layer is very dark brown silt loam 3 inches thick. Several layers make up the subsoil. The topmost layer of the subsoil is dark-brown silty clay loam. Deeper layers are dark yellowish-brown silty clay loam and clay loam and brown loam. The subsoil is underlain by calcareous loam glacial till at a depth of about 43 inches.

Corwin soils have a medium available moisture capacity and moderately slow permeability. They are seasonally saturated for short periods in winter and early in spring. Organic-matter content is high in the uppermost 10 to 13 inches of these soils. The root zone is medium acid or strongly acid. Acidity decreases as depth increases.

Most areas of Corwin soils are cultivated. These soils are well suited to farming if management is optimum. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow.

Representative profile of a Corwin silt loam, SW¼NW¼, sec. 27, T. 6 N., R. 4 E., Clay Township; (Sample MT–6 in laboratory data) :

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; very friable; neutral; clear, smooth boundary.

A1—6 to 9 inches, very dark brown (10YR 2/2) silt loam; weak, fine, granular structure; very friable; neutral; clear, smooth boundary.

B21t—9 to 13 inches, dark-brown (10YR 3/3) silty clay loam; moderate, fine, subangular blocky structure; friable; thin, continuous, very dark brown (10YR 2/2) clay films on ped surfaces; neutral; clear, smooth boundary.

IIB22t—13 to 17 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, coarse, subangular blocky structure parting to moderate, fine and medium, subangular blocky structure; firm; medium, continuous, very dark brown (10YR 2/2) and very dark grayish-brown (10YR 3/2) clay films on the vertical faces of the peds and medium patchy coatings of very dark brown and very dark grayish brown (10YR 2/2, 3/2)

on the horizontal faces; neutral; clear, smooth boundary.

IIB23t—17 to 24 inches, dark yellowish-brown (10YR 4/4) silty clay loam; weak, medium, prismatic structure parting to moderate, medium and coarse, subangular blocky structure; firm; very dark brown (10YR 2/2) and very dark grayish-brown (10YR 3/2) patchy clay films on the vertical faces of the peds and thin patchy clay films on the horizontal faces; neutral; gradual, smooth boundary.

IIB24t—24 to 30 inches, dark yellowish-brown (10YR 4/4) silty clay loam that has few, medium, faint, gray (10YR 5/1) mottles and many, medium, faint, yellowish-brown (10YR 5/6) mottles; very weak, coarse, prismatic structure parting to weak, coarse, subangular blocky structure; firm; medium, very dark grayish-brown (10YR 3/2) clay films that are continuous on the vertical faces of the peds and patchy on the horizontal faces; few shale fragments; mildly alkaline; gradual, smooth boundary.

IIB25t—30 to 36 inches, yellowish-brown (10YR 5/6) and dark yellowish-brown (10YR 4/4) clay loam that has few, medium, faint, gray (10YR 5/1) mottles and many, medium, faint, yellowish-brown (10YR 5/8) mottles; very weak, coarse, prismatic structure; firm; thin, patchy, very dark gray (10YR 3/1) clay films on vertical and horizontal faces of peds; mildly alkaline; abrupt, irregular boundary.

IIB3—36 to 43 inches, brown (10YR 4/3) loam that has few, medium, faint, gray (10YR 5/1) mottles and many, medium, faint, yellowish-brown (10YR 5/8) mottles; very weak, coarse, prismatic structure; firm; very dark grayish-brown (10YR 3/2) clay coatings on vertical faces of the peds; many till pebbles and highly weathered limestone remnants; calcareous ped interiors; clear, wavy boundary.

IIC—43 to 60 inches, brown (10YR 4/3) loam till; massive; firm; gray (10YR 5/1) streaks; moderately alkaline, strongly calcareous.

The depth to calcareous material ranges from about 25 to 40 inches. The A horizon is very dark brown (10YR 2/2), black (10YR 2/1), and very dark grayish brown (10YR 3/2). The matrix of the B2 horizon is brown (10YR 4/3), dark brown (10YR 3/3), dark yellowish brown (10YR 4/4), or yellowish brown (10YR 5/6). Films of very dark grayish brown (10YR 3/1) are common on ped surfaces in the B2 horizon. The B2 horizon is clay loam or silty clay loam. The A horizon ranges from strongly acid to neutral. Horizons deeper in the profile are progressively less acid.

Corwin soils are adjacent to Miamian, Celina, and Brookston soils. They have a dark-colored surface layer, but Miamian and Celina soils have a light-colored surface layer. Corwin soils are moderately well drained, but Brookston soils are very poorly drained. The silt capping of the Corwin soils is 18 inches thick or less, but it is 18 to 40 inches in the Dana soils. Corwin soils have no bedrock at a depth of less than 40 inches, whereas the dark-colored Plattville soils have limestone bedrock at a depth of 20 to 40 inches.

Corwin silt loam, 0 to 2 percent slopes (CoA).—This soil is in small, isolated spots that generally are less than 10 acres in size and occur on the till plain throughout the county. This soil dries out more slowly in spring than gently sloping Corwin soils. Surface runoff is slow.

This soil is commonly next to areas of lighter colored Celina soils and wetter, dark-colored Brookston soils. Small areas of these adjacent soils are included with this soil in mapping. The dark-colored included areas of Brookston soils are generally along small drainageways.

This soil has no major limitations to use for farming. Moderately slow permeability is a limitation for some nonfarm uses. (Capability unit I–2)

Corwin silt loam, 2 to 6 percent slopes (CoB).—This soil is in wide, convex strips around the base of limestone-controlled hills and in small, irregularly shaped spots on the till plains. Surface runoff is medium to rapid.

Included in mapping are areas that are somewhat poorly drained, areas that are underlain by limestone at a depth of less than 40 inches, and small areas of well-drained soils. Also included is a small acreage of soils having slopes of 6 to 12 percent.

The hazard of erosion is the major limitation to use of this soil for farming. Slope and moderately slow permeability are limitations for some nonfarm uses. (Capability unit IIe–4)

Crosby Series

The Crosby series consists of somewhat poorly drained soils that formed in calcareous loam glacial till. In places the till is capped with up to 18 inches of silty loess. Crosby soils are on uplands and are nearly level to gently sloping. They are common throughout the county except in the southeastern part.

A representative profile of a Crosby soil has a dark grayish-brown silt loam plow layer about 8 inches thick. The subsoil is dark grayish-brown or brown silty clay loam, clay loam, and loam mottled with yellowish brown. Grayish coatings are on the structural faces. Below this, at a depth of about 31 inches, is calcareous loam glacial till. This till is firm and compact, and it restricts movement of water and penetration of roots.

Crosby soils have a medium available moisture capacity and moderately slow permeability. Their water table is high during wet periods, but they drain well if tile is used. Drainage helps to improve crop growth by lowering the seasonal high water table. The root zone in Crosby soils is mostly moderately deep, and it is medium acid to strongly acid in the upper part. Soil reaction is less acid as depth increases.

Most areas of Crosby soils are cultivated. These soils are well suited to farming if they are drained. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow. Some areas are wooded (fig. 9), especially those that are not drained.

Representative profile of Crosby silt loam, 0 to 2 percent slopes, NW¼SW¼ sec. 5, T. 5 N., R. 4 E.; Perry Township:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

B21tg—8 to 14 inches, dark grayish-brown (10YR 4/2) silty clay loam that has common, medium, distinct, gray (10YR 5/1) mottles and common, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, fine, subangular blocky structure; firm; thin, patchy clay films on ped faces; few oxide concretions; medium acid; clear, smooth boundary.

IIB22tg—14 to 20 inches, dark grayish-brown (10YR 4/2) clay loam that has common, medium, faint, brown (10YR 5/3) mottles and few, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, fine, subangular blocky structure; firm; many fine oxide concretions; thin, continuous, dark grayish-brown (10YR 4/2) clay films on vertical faces of peds and thin, patchy, dark grayish-brown (10YR 4/2) clay films on horizontal faces of peds; slightly acid; gradual, smooth boundary.

IIB23tg—20 to 26 inches, brown (10YR 5/3) clay loam that has common, fine, faint, yellowish-brown (10YR 5/6) mottles and common, medium, faint, yellowish-brown

Figure 9.—**Farm woodlot on a somewhat poorly drained Crosby silt loam. The trees are oak, maple, ash, and hickory. Nearly all soils in Montgomery County formed under this type of vegetation.**

(10YR 5/4) mottles; moderate, medium, subangular blocky structure; firm; thick, patchy, gray (10YR 5/1) clay films on horizontal faces of peds; few oxide concretions; neutral; clear, smooth boundary.

IIB3—26 to 31 inches, brown (10YR 5/3) loam that has many, coarse, faint, yellowish-brown (10YR 5/4) mottles and few, fine, faint, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; firm; thin, patchy, gray (10YR 5/1) clay films on vertical faces of peds; few weathered limestone remnants; very few, dark-brown or black oxide concretions; mildly alkaline; slightly calcareous; clear, smooth boundary.

IIC—31 to 60 inches, brown (10YR 5/3) loam that has common, medium, faint, yellowish-brown (10YR 5/4 and 5/6) mottles; massive; firm; thin, light brownish-gray (10YR 6/2) streaks; moderately alkaline; strongly calcareous.

The A horizon is dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or brown (10YR 4/3). In the B horizon, the matrix colors are dark gray (10YR 4/1), dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or brown (10YR 4/3 and 10YR 5/3). A grayish matrix is not dominant in the B horizon in all places. Mottles in the B horizon have a hue of 10YR, values of 4 and 5, and chromas of 1 to 6. Clay films in the B horizon are dark grayish brown (10YR 4/2) or gray (10YR 5/1).

The B2 horizon dominantly is clay loam or silty clay loam, but some part of the B horizon is generally clay. Depth from the surface to mottled horizons ranges from 6 to 9 inches. Depth to calcareous material is at a minimum where Crosby soils are adjacent to Lewisburg and Pyrmont soils. Minimum reaction of the solum is in the B1 horizon where present, or in the upper part of the B2 horizon, and is strongly acid to slightly acid. The solum is less acid as depth increases.

Crosby soils are adjacent to Miamian, Celina, and Brookston soils. Crosby soils are less well drained than Miamian and Celina soils and are lighter colored and better drained than the very poorly drained Brookston soils. The silt capping is less than 18 inches thick on the Crosby soils, but it is more than 18 inches thick on the Fincastle soils. Crosby soils are deeper to calcareous till than Pyrmont soils. Bedrock is not within 40 inches of the surface of the Crosby soils, but the somewhat poorly drained Randolph soils have limestone bedrock within 40 inches of the surface.

Crosby silt loam, 0 to 2 percent slopes (CsA).—This soil is on low knolls on the till plain, around the dark-colored soils in the depressions at the heads of waterways, and on the broad, flat crowns of ridges. This soil dries slowly in spring unless it is drained. Surface runoff is slow to ponded. The profile of this soil is the one described as representative for the series.

Included in mapping are small strips or spots of Celina soils on the crests of the knolls and small areas of Brookston soils in slightly depressional wet spots. Also included are bouldery areas in some places.

Seasonal wetness is the major limitation of this soil for farming (fig. 10). A seasonal high water table and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIw-3)

Crosby-Celina silt loams, 2 to 6 percent slopes (CtB).—This mapping unit is about 55 percent Crosby soils, about 35 percent Celina soils, and about 10 percent included soils. The soils are on knolls on the till plain, on lower slopes extending to drainageways, and on broad drainage divides between the steeper side slopes. In areas of Crosby soils, slopes generally do not exceed 4 percent. In areas of Celina soils, slopes are typically 3 to 6 percent.

Included in mapping are small areas of wetter Brookston soils along drainageways.

Seasonal wetness is the dominant limitation to farming. Erosion is a hazard on the steeper slopes. A seasonal high water table and moderately slow permeability are limitations for some nonfarm uses. (Capability unit IIw-3)

Crosby-Urban land complex (Cu).—The soils in this mapping unit are nearly level and occur on uplands underlain by glacial till. Most of these soils have been so disturbed or buried by earthmoving or fill operations that natural soil characteristics have been erased and precise classification cannot be made. The few undisturbed spots are dominantly Crosby soils that have a profile similar to the one described as representative for the series.

Included in mapping are some undisturbed spots of Fincastle, Xenia, and Brookston soils.

The soils in this mapping unit are somewhat poorly drained. Seasonal wetness and moderately slowly permeability are the major limitations for many uses. (Capability unit not assigned)

Dana Series

The Dana series consists of dark-colored, moderately well drained soils that formed in 18 to 40 inches of loess and underlying calcareous loam glacial till. These soils are gently sloping and are on uplands in the southeastern part of the county.

In a representative profile, the surface layer is black silt loam and silty clay loam 12 inches thick. The upper part of the subsoil is dark yellowish-brown silty clay loam. The lower part is dark yellowish-brown silty clay loam and clay loam. The underlying material is at a depth of about 36 inches and consists of calcareous loam glacial till.

Dana soils have a high available moisture capacity and moderately slow permeability. Their surface layer is high in organic-matter content. The root zone in Dana soils is moderately deep to deep and is mostly neutral.

Figure 10.—Soybeans on a somewhat poorly drained Crosby silt loam.

Most areas of Dana soils are cultivated. These soils are well suited to farming. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow.

Representative profile of Dana silt loam, 2 to 6 percent slopes, NW¼SE¼ sec. 11, R. 5, T. 2; Miami Township:

Ap—0 to 7 inches, black (10YR 2/1) silt loam; moderate, medium, granular structure; friable; slightly acid; abrupt, smooth boundary.

A1—7 to 12 inches, black (10YR 2/1) light silty clay loam; strong, fine and medium, subangular blocky structure; firm; slightly acid; clear, smooth boundary.

B21t—12 to 18 inches, dark yellowish-brown (10YR 4/4) silty clay loam; strong, medium and coarse, subangular blocky structure; firm; medium, continuous, very dark gray (10YR 3/1) clay films on ped faces; neutral; clear, smooth boundary.

B22t—18 to 28 inches, dark yellowish-brown (10YR 4/4) silty clay loam that has few, fine, faint, yellowish-brown (10YR 5/8) mottles; moderate, medium and coarse, subangular blocky structure; firm; medium, continuous, very dark gray (10YR 3/1) clay films on ped surfaces; neutral; clear, smooth boundary.

IIB3—28 to 36 inches, dark yellowish-brown (10YR 4/4) clay loam that has few, fine, faint, yellowish-brown (10YR 5/8) mottles; very weak, coarse, subangular blocky structure; friable; neutral; clear, wavy boundary.

IIC—36 to 60 inches, grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/4) loam till; massive; firm; moderately alkaline; calcareous.

The wind-deposited silt ranges from 18 to 40 inches in thickness. Depth to calcareous material ranges from about 34 inches to 56 inches. The dark A horizon is black (10YR 2/1), very dark brown (10YR 2/2), very dark gray (10YR 3/1), or very dark grayish brown (10YR 3/2). The B2t horizon is brown (10YR 4/3) or dark yellowish brown (10YR 4/4). Ped coatings in the B2t horizon are very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2). The B2t horizon is silty clay loam or clay loam. Depth to mottling ranges from 14 to 24 inches. The A horizon is medium acid to neutral, and the reaction increases as depth in the solum increases.

Dana soils are adjacent to Xenia, Russell, and Brookston soils. They have a darker colored surface layer than Xenia and Russell soils. Dana soils are moderately well drained, whereas Brookston soils are very poorly drained. The mantle of silt in Dana soils is 18 to 40 inches thick, but that of Corwin soils is less than 18 inches thick.

Dana silt loam, 2 to 6 percent slopes (DaB).—This soil is in strips around the base of hills controlled by limestone bedrock and is on the till plain. It lies between areas of Brookston and Russell soils.

Included in mapping are areas of nearly level soils and of better drained soils.

This soil has very good tilth. Surface runoff is medium.

The major limitation to use of this soil for farming is the hazard of erosion. Moderately slow permeability and slope are limitations for some nonfarm uses. (Capability unit IIe-4)

Fairmount Series

The Fairmount series consists of well-drained, dark-colored soils that formed in residuum weathered from thin-bedded limestone and clay shale bedrock. These soils are moderately steep and very steep.

In a representative profile, the surface layer is very dark grayish-brown silty clay loam about 7 inches thick. The subsoil is olive-brown and olive silty clay. It overlies interbedded limestone and clay shale bedrock at a depth of 19 inches.

Fairmount soils have a low available moisture capacity and moderately slow permeability. They have a shallow rooting depth and are neutral to moderately alkaline. The primary use of these soils is for pasture and trees.

Representative profile of a Fairmount silty clay loam, NE¼NE¼SW¼ sec. 31, T. 4 N., R. 4 E.; Jackson Township:

A1—0 to 7 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, fine, subangular blocky structure; friable; neutral; abrupt, smooth boundary.

B21—7 to 12 inches, olive-brown (2.5Y 4/4) silty clay; moderate, coarse, prismatic structure parting to strong, medium, subangular blocky structure; firm; dark grayish-brown (2.5Y 4/2) stains on ped surfaces; mildly alkaline; clear, smooth boundary.

B22—12 to 19 inches, olive (5Y 5/3) silty clay; moderate, coarse, prismatic structure breaking to weak, medium, subangular blocky structure; firm; thin, discontinuous, grayish-brown (2.5Y 5/2) coatings on ped surfaces; thin line of stone fragments along upper boundary; moderately alkaline, calcareous; abrupt, smooth boundary.

C—19 inches, interbedded limestone and calcareous clay shale bedrock.

The A horizon is black (10YR 2/1), very dark brown (10YR 2/2), or very dark grayish brown (10YR 3/2 to 2.5Y 3/2). Except in eroded areas, it ranges from 6 to 8 inches in thickness. The B horizon is olive (5Y 5/3, 5/6, 4/3, or 4/4) olive gray (5Y 4/2), light olive brown (2.5Y 5/4), or olive brown (2.5Y 4/4). Stains slightly darker than the matrix are fairly common on the ped surfaces. Where a B1 horizon occurs, it is silty clay loam or light silty clay. The B2 horizon is silty clay or clay. Depth to the underlying C horizon, which is limestone or calcareous clay shale, ranges from about 12 inches to 20 inches. Limestone fragments occur throughout the profile in amounts estimated at 1 to 5 percent, by volume.

Fairmount soils are adjacent to Ritchey and Milton soils. They occupy positions similar to those of Lorenzo-Rodman complexes and of undifferentiated Rodman and Fox soils and Hennepin and Miamian soils. Fairmount soils formed entirely in residual materials and have a dark-colored surface layer, whereas Ritchey and Milton soils formed in glacial till over limestone and clay shale bedrock and have a light-colored surface layer. Unlike Fairmount soils, Lorenzo-Rodman complexes and the undifferentiated Rodman and Fox soils and Hennepin and Miamian soils formed in glacial till and outwash materials. The Fairmount soils are more shallow to limestone and shale than the dark-colored Plattville soils.

Fairmount silty clay loam, 12 to 25 percent slopes, moderately eroded (FaE2).—This soil is in narrow bands around the sides of hills and is underlain by limestone bedrock. The profile of this soil is similar to the one described as representative for the Fairmount series, except that erosion has removed so much of the original dark surface layer that only 3 or 4 inches of it remains over the olive-brown subsoil. Rills have cut into the upper part of the subsoil in places. The water infiltration rate and available moisture capacity are lower than for uneroded Fairmount soils. Surface runoff is rapid.

Included in mapping are small areas of Milton and Ritchey soils and small areas of a soil that is similar to Fairmount soils but is up to 36 inches thick over bedrock. Also included are a few acres of Fairmount silty clay loam that has slopes of 6 to 12 percent and a few areas that are severely eroded. The severely eroded areas are shown by a special symbol on the soil maps.

The hazard of further erosion is the major limitation to use of this soil for farming. Slope is a limitation for most nonfarm uses. (Capability unit VIe–2)

Fairmount silty clay loam, 25 to 50 percent slopes, moderately eroded (FaF2).—This soil is in narrow bands around the sides of hills and is underlain by limestone bedrock. The profile of this soil is similar to the one described as representative for the Fairmount series, except that erosion has removed so much of the original dark surface layer that only 2 or 3 inches of it remains. Rills have cut into the olive-brown upper part of the subsoil in places. Surface runoff is very rapid.

Included in mapping are small areas of Ritchey soils that formed in a thin layer of glacial till over limestone bedrock. Also included are areas of Fairmount soils that are only slightly eroded and areas that have 10 to 15 percent of the surface covered by flagstones. These stony areas are shown by a special symbol on the soil maps.

The hazard of further erosion is the major limitation to use of this soil for farming. The very steep slopes are a limitation for many farm and nonfarm uses. (Capability unit VIe–2)

Fincastle Series

The Fincastle series consists of somewhat poorly drained soils that formed partly in loess and partly in weathered loam glacial till. Fincastle soils are nearly level to gently sloping, and they occupy upland areas in the southeastern part of the county.

A representative profile has a dark grayish-brown silt loam plow layer about 8 inches thick. Beneath the plow layer is grayish-brown silt loam that is 5 inches thick and is distinctly mottled with brown. At depths between 13 and 19 inches is mottled pale-brown silt loam. The subsoil is between depths of 19 and 38 inches. It consists of brown and dark yellowish-brown silty clay loam and clay loam mottled with grayish brown and yellowish brown. Underlying the subsoil is calcareous, yellowish-brown loam glacial till.

The Fincastle soils have a seasonal high water table that hinders farming unless they are artificially drained. The available moisture capacity is medium to high, and permeability is moderately slow. Fincastle soils have a moderately deep to deep root zone that is strongly acid in the upper 1½ to 2 feet in some places. These soils are less acid as depth increases.

Most areas of the Fincastle soils are cultivated. These soils are well suited to farming if they are drained. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow.

Representative profile of Fincastle silt loam, 0 to 4 percent slopes, NE¼NE¼ sec. 34, R. 5, T. 3; Washington Township:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, very fine, granular structure; friable; medium acid; abrupt, smooth boundary.

A2—8 to 13 inches, grayish-brown (10YR 5/2) silt loam; few, fine, distinct, brown (10YR 4/3) mottles; weak, medium, granular structure; friable; medium acid; abrupt, smooth boundary.

A&B—13 to 19 inches, pale-brown (10YR 6/3) silt loam that has few, medium, faint, yellowish-brown (10YR 5/8) mottles and common, fine, faint, yellowish-brown (10YR 5/4, 5/6) mottles; weak, medium, subangular blocky structure; friable; medium acid; clear, smooth boundary.

B21t—19 to 25 inches, brown (10YR 4/3) silty clay loam that has common, medium, faint, grayish-brown (10YR 5/2) mottles and common, fine, faint, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; firm; thin, continuous, dark grayish-brown (10YR 4/2) clay films on ped surfaces; dark oxide stains; medium acid; clear, smooth boundary.

IIB22t—25 to 31 inches, brown (10YR 4/3) clay loam that has common, medium, faint, grayish-brown (10YR 5/2) mottles and few, fine, faint, yellowish-brown (10YR 5/8) mottles; moderate, medium, prismatic structure breaking to moderate, medium, subangular blocky structure; very firm; continuous, medium, dark grayish-brown (10YR 4/2) clay films on horizontal and vertical faces of peds; oxide concretions; neutral; clear, wavy boundary.

IIB3t—31 to 38 inches, dark yellowish-brown (10YR 4/4) silty clay loam that has few, fine, faint, yellowish-brown (10YR 5/6) mottles; weak, fine and medium, subangular blocky structure; firm; continuous; medium, dark-gray (10YR 4/1) clay films on the vertical faces of peds; moderately alkaline; clear, wavy boundary.

IIC—38 to 60 inches, yellowish-brown (10YR 5/4) loam till; massive; friable; moderately alkaline, calcareous.

The loess ranges from 18 to about 40 inches in thickness. Depth to the calcareous C horizon ranges from 34 inches to about 42 inches. The Ap horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 4/3). The matrix of the B2t horizon ranges from dark yellowish brown (10YR 4/4) to brown (10YR 4/3) and yellowish brown (10YR 5/4). Mottles and ped coatings that have a chroma of 2 or 1 are present in the Bt horizon. The B2t horizon is silty clay loam and clay loam. The upper part of the B2t horizon is strongly acid to slightly acid.

Fincastle soils are somewhat poorly drained members of a drainage sequence that includes the well drained Russell soils, the moderately well drained Xenia soils, and the very poorly drained Brookston soils. Fincastle soils are commonly adjacent to the Xenia and Brookston soils. They are similar to the Crosby soils but have a thicker loess capping.

Fincastle silt loam, 0 to 4 percent slopes (FcA).—This soil is on large, flat ridge crowns on the till plain. It also lies in narrow bands along drainageways and on low ridges bordering areas of Brookston soils. Surface runoff from the nearly level areas of this soil is slow, but where slopes are more than 2 percent, surface runoff is medium.

Included in mapping are small areas of Brookston soils along the drainageways and small areas of Crosby soils where the silt capping over the glacial till is thin. Also included are some areas of a soil that has a very dark grayish-brown surface layer.

Seasonal wetness is the major limitation to use of this soil for farming. A seasonal high water table and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIw–3)

Fox Series

The Fox series consists of well-drained soils that formed in loamy glacial outwash material. These soils have a substratum of sand and gravel at a depth of 24 to 42 inches. Fox soils are nearly level to very steep, and they occupy areas on terraces along the major streams in the county.

A representative profile has a dark yellowish-brown silt loam plow layer about 8 inches thick. The subsoil consists of layers of mainly brown loam, dark-brown clay loam,

and reddish-brown and brown sandy clay loam. It extends to a depth of 29 inches, where calcareous sand and gravel occur.

Fox soils most commonly have a moderately deep root zone. The available moisture capacity is medium to low, depending on the depth to sand and gravel. These soils dry out and warm up early in spring, but they tend to be droughty later in the growing season. Permeability is moderate in the subsoil and is rapid in the sandy and gravelly substratum. Fox soils are strongly acid in the upper 1½ feet in some places, but they are less acid as depth increases.

Most areas of Fox soils are cultivated. The suitability of these soils for farming depends on slope and erosion. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow. Some truck and nursery crops are also grown, and some areas are wooded.

Representative profile of Fox silt loam, 0 to 2 percent slopes, NE¼SE¼NE¼ sec. 19, T. 3 N., R. 4 E.; German Township; (Sample MT–17 in laboratory data):

Ap—0 to 8 inches, dark yellowish-brown (10YR 3/4) silt loam; weak, very fine and fine, granular structure; friable; medium acid; abrupt, smooth boundary.

B1—8 to 11 inches, brown (7.5YR 4/4) loam; weak, medium, subangular blocky structure parting to moderate, fine, subangular blocky structure; friable; strongly acid; clear, smooth boundary.

B21t—11 to 14 inches, dark-brown (7.5YR 4/4) clay loam; moderate, fine, subangular blocky structure; firm; medium, patchy, dark reddish-brown (5YR 3/4) clay films on ped faces; some pebbles; very strongly acid; clear, smooth boundary.

B22t—14 to 20 inches, reddish-brown (5YR 4/4) sandy clay loam; weak, medium, subangular blocky structure; firm; medium, patchy, dark reddish-brown (5YR 3/4) clay films on horizontal ped faces and thick, patchy, dark reddish-brown (5YR 3/4) clay films on vertical ped faces; some pebbles; very strongly acid; clear, smooth boundary.

B23t—20 to 26 inches, brown (7.5YR 4/4) sandy clay loam; very weak, medium, subangular blocky structure; firm; fine dark reddish-brown (5YR 3/4) clay films; strongly acid; clear, wavy boundary.

IIB3t—26 to 29 inches, brown (7.5YR 4/4) gravelly sandy loam; massive; friable; medium, dark-brown (7.5YR 3/2) clay that bridges sand grains; neutral; clear, wavy boundary.

IIC—29 to 60 inches, brown (10YR 5/3) mixed sand and gravel; single grain; loose; 75 percent coarse material; 10 to 15 percent cobblestones; calcareous.

The A horizon is silt loam, loam, and sandy loam. The B2t horizon is sandy clay loam, sandy clay, gravelly clay loam, clay loam, or clay. The A horizon is dark yellowish brown (10YR 3/4 and 4/4) and brown (10YR 4/3). The B horizon is dark brown (7.5YR 3/4 and 4/4), brown (7.5YR 4/4), reddish brown (5YR 4/4), or dark reddish brown (5YR 3/3 and 3/4). Depth to calcareous sand and gravel ranges from 24 to 42 inches. Reaction of the B1 horizon or the upper part of the B2 horizon ranges from very strongly acid to slightly acid.

Included in all Fox mapping units in this county are areas in which the uppermost part of the B2 horizon contains slightly more clay than is typical of Fox soils elsewhere. These inclusions, though outside the range of the Fox series, are similar to Fox soils in use and management.

Fox soils are adjacent to Ockley, Thackery, Warsaw, Wea, and Lorenzo soils. They are not so deep to sand and gravel as Ockley, Thackery, and Wea soils, but they are deeper to sand and gravel than Lorenzo soils. The Fox soils have a lighter colored surface layer than Warsaw, Wea, and Lorenzo soils. Fox soils differ from Kendallville soils in that Kendallville soils are underlain by calcareous glacial till at a depth of less than 42 inches.

Fox sandy loam, 0 to 2 percent slopes (FkA).—This soil is in large areas on terraces along the major streams. Its profile has 20 to 30 percent more sand and proportionately less silt and clay in the surface layer than the profile described as representative for the Fox series. The sand content of the subsoil is also somewhat higher, and as a result, the available moisture capacity of this soil is lower than that of Fox loam or Fox silt loam.

Surface runoff is slow. Tilth is good, and this soil is not subject to crusting. This soil tends to be droughty more quickly than Fox silt loam or Fox loam.

This soil is well suited to truck crops, but irrigation may be needed during dry periods to insure good crop growth. Rapid permeability in the substratum is a limitation for some nonfarm uses. (Capability unit IIs–1)

Fox sandy loam, 2 to 6 percent slopes (FkB).—This soil is in irregularly shaped spots and strips on the terraces along the major streams. Its profile has 20 to 30 percent more sand and proportionately less silt and clay in the surface layer than the profile described as representative for the Fox series. The sand content of the subsoil also is somewhat higher. This soil therefore has a lower available moisture capacity than Fox loam or Fox silt loam. Tilth is generally good.

The hazard of erosion is the major limitation to use of this soil for farming. Droughtiness is a secondary limitation during prolonged dry periods. Slope and rapid permeability in the substratum are limitations for some nonfarm uses. (Capability unit IIe–2)

Fox loam, 0 to 2 percent slopes (FlA).—This soil is in broad, uniform areas on the terraces along the major streams and their larger tributaries. It has a profile similar to the one described as representative for the Fox series except that it has more sand and less silt in the surface layer. This soil has very good tilth. It is less susceptible to surface crusting than Fox silt loam and tends to be more droughty.

Included in mapping are areas that border the uplands and are underlain by loam till at a depth of 5 to 6 feet. Also included are a few gravelly areas that are shown on the soil map by a special symbol.

Droughtiness is the major limitation to use of this soil for farming. Rapid permeability in the substratum is a limitation for some nonfarm uses. This Fox soil is well suited to truck crops, but irrigation may be needed during dry periods. (Capability unit IIs–1)

Fox loam, 2 to 6 percent slopes (FlB).—This soil is on broad, gently rolling ridges on the terraces along major streams and their tributaries. It has a profile similar to the one described as representative for the Fox series except that its surface layer contains more sand and less silt. This coarser textured surface layer is more easily tilled than that of Fox silt loam and is less susceptible to surface crusting. Also, this soil is less susceptible to erosion than Fox silt loam.

Included in mapping are 1- to 5-acre areas of soils that have a gravelly surface layer and are generally more gravelly than this soil throughout. These included areas are very droughty, as are other included areas of a reddish, moderately eroded soil.

A moderate erosion hazard is the major limitation to use of this soil for farming. Slope and rapid permeability in the substratum are limitations for some nonfarm uses. (Capability unit IIe-2)

Fox loam, 6 to 12 percent slopes, moderately eroded (FlC2).—This soil has short slopes on the broad, rolling terraces along the larger streams. It is eroded to the extent that only 2 or 3 inches of the original surface layer remains over the dark-brown or reddish subsoil. The profile of this soil has more sand and less silt in the surface layer than has the profile described as representative for the Fox series. As a result of erosion, natural fertility, available moisture capacity, and organic-matter content are lower than in an uneroded Fox soil. Surface runoff is rapid.

Included in mapping are areas of soils that have a gravelly or sandy loam surface layer.

The hazard of further erosion is the major limitation to use of this soil for farming. Slopes and rapid permeability in the substratum are limitations for some nonfarm uses. (Capability unit IIIe-1)

Fox silt loam, 0 to 2 percent slopes (FmA).—This soil is in broad stretches on the terraces along the major streams and their larger tributaries. It has the profile described as representative for the series. The moisture content of this soil generally is more favorable for crop growth than that of any other Fox soil. The surface layer is susceptible to some crusting.

Included in mapping are small areas of Ockley soils and Lorenzo soils. Also included are small areas that border the uplands and are underlain by loam till at a depth of 5 or 6 feet or have 6 to 8 inches of dark-colored silt loam on the surface.

Droughtiness is the major limitation to use of this soil for farming. This soil is well suited to truck crops, but irrigation may be needed during dry periods. Rapid permeability in the substratum is a limitation for some nonfarm uses. (Capability unit IIs-1)

Fox silt loam, 2 to 6 percent slopes (FmB).—This soil is on broad stretches on the terraces along major streams and their larger tributaries. Its silt loam surface layer is subject to crusting.

Included in mapping are small areas of soils that are thicker than this soil and of Lorenzo soils that are thinner. Also included are small, moderately eroded areas that typically are more reddish and more droughty than uneroded soils.

Surface runoff is medium to rapid, and the erosion hazard is moderate.

The erosion hazard is the major limitation to use for farming. This soil is well suited to truck crops if management is optimum. Slope and rapid permeability in the substratum are limitations for some nonfarm uses. (Capability unit IIe-2)

Fox silt loam, 6 to 12 percent slopes, moderately eroded (FmC2).—This soil has short slopes on broad, rolling terraces of larger streams and on hilly gravel deposits. It has a profile similar to the one described as representative for the Fox series except that it is eroded so much that the plow layer is a mixture of the original surface layer and the upper part of the subsoil. The resultant plow layer is less favorable for germination of seeds and growth of seedlings.

Included in mapping are small areas of thinner Lorenzo soils.

Surface runoff is rapid, and erosion is a severe hazard if this soil is farmed. The short slopes generally prohibit use of conservation measures so that soil losses through erosion continue. A thick plant cover helps to control erosion. Slope and rapid permeability in the substratum are limitations for many nonfarm uses. (Capability unit IIIe-1)

Fox silt loam, 12 to 18 percent slopes, moderately eroded (FmD2).—This soil is on the outer edges of broad, rolling terraces of major streams and on hilly gravel deposits. It is eroded so much that only 2 or 3 inches of the original silt loam surface layer remains over the finer textured subsoil. Rills have cut into the subsoil in places.

Included in mapping are small, severely eroded areas where only subsoil layers remain over the gravel and where spots of gravel are exposed. Also included are small areas of a soil that has a loam surface layer. The severely eroded and gravelly spots are indicated on the soil maps by a special symbol.

A very severe hazard of further erosion is the major limitation to use of this soil for farming. Droughtiness is a secondary limitation. This soil is not well suited to row crops, but it is suited to small grains. Slope is the dominant limitation for many nonfarm uses. (Capability unit IVe-1)

Fox soils, 6 to 12 percent slopes, severely eroded (FsC3).—These soils have short slopes on broad, rolling terraces along larger streams and on hilly gravel deposits. They have a profile similar to the one described as representative for the Fox series except that the plow layer is mostly former subsoil because the original surface layer has been eroded away. In some places the surface layer is clay loam. In other places it is silt loam, loam, or gravelly loam. The moisture content of these soils is the least favorable for growing plants of any of the Fox soils mapped in the county.

A very severe hazard of further erosion is the major limitation to use of these soils for farming. The soils are not well suited to row crops. Droughtiness is a secondary limitation for farming. Slope, erosion, and rapid permeability in the subsoil are limitations for some nonfarm uses. (Capability unit IVe-1)

Fox-Urban land complex, gently sloping (FuB).—The soils in this mapping unit are nearly level and gently sloping. They occupy stream terraces that have been developed for residential and industrial use. The soils in most areas have been disturbed or buried by filling and other earth-moving operations. The undisturbed spots are dominantly well-drained Fox soils that have a profile similar to the one described as representative for the Fox series.

Included in mapping are areas of well drained Ockley, Warsaw, and Wea soils and of moderately well drained Thackery soils.

The soils in this unit are well drained in most places and are mostly underlain by calcareous sand and gravel at a depth of 24 to 42 inches.

Droughtiness is the major limitation when ornamental trees and shrubs are grown. The soils in this complex provide stable sites for buildings. Erosion on construction sites is a hazard, particularly where the soils are gently

sloping. Because sand and gravel are near the surface, it is desirable to stockpile topsoil for use after construction is completed. Because permeability is rapid in the underlying sand and gravel, pollution of underground water, especially from septic tanks, is a hazard. The sand and gravel underlying the soils in this mapping unit far below the surface are an excellent source of underground water and should be protected from pollution. (Capability unit not assigned)

Fox-Urban land complex, rolling (FuC).—The soils in this mapping unit are rolling and are on stream terraces that have been developed for residential and industrial use. Slopes range from 6 to 12 percent. Most areas of the original soils of the unit have been disturbed or buried by filling or other earth-moving operations and can no longer be classified by natural characteristics. The undisturbed spots are dominantly well-drained Fox soils that have a profile similar to the one described as representative for the series.

Included in mapping are areas of deeper Ockley soils.

The hazard of erosion is the major limitation to use of these soils. Surface runoff is rapid in many places, particularly in disturbed areas where construction is proceeding. Loss of soil on these sites is likely to be excessive. Droughtiness is a limitation where ornamental trees and shrubs are grown. It is desirable to stockpile topsoil for use after construction because sand and gravel is not far from the surface. The underlying sand and gravel is an excellent source of underground water, but it is likely to be polluted by septic tank effluent because of inadequate filtration above the sand and gravel. (Capability unit not assigned)

Fox-Urban land complex, steep (FuF).—The soils in this mapping unit are moderately steep and steep and are on kame terraces that have been developed for residential use. Slopes are more than 12 percent. Areas of the soils in 50 percent of the mapping unit are so disturbed or buried by filling and other earth-moving operations that they can no longer be classified by natural characteristics. The undisturbed spots are dominantly well-drained Fox soils that have a profile similar to the one described as representative for the series.

Included in mapping are areas of the deeper Ockley soils and areas of the thinner Rodman soils.

The soils in this mapping unit are well drained and are underlain by calcareous sand and gravel at a depth of 10 to 40 inches or more.

Surface runoff typically is very rapid. A very severe hazard of erosion is the major limitation in areas being developed. Droughtiness is a limitation to use for ornamental trees and shrubs. Because sand and gravel is not far from the surface, it is desirable to stockpile topsoil for use after construction is completed. Slope is a severe limitation for many community uses. Underground water is highly susceptible to pollution because permeability is rapid in the underlying sand and gravel. (Capability unit not assigned)

Gravel Pits

Gravel pits (Gp) consists of open excavations from which sand and gravel have been removed. Such areas have practically no value for farming, because the upper soil layers have been stripped away. This land type generally is in areas of the Fox, Ockley, Rodman, and Lorenzo soils. Areas of this land type are indicated on the soil maps by the words "gravel pit" or, if they are small, by a conventional symbol. Gravel pits that are no longer mined have a potential for recreation or wildlife use. (Capability unit not assigned)

Hennepin Series

The Hennepin series consists of well-drained soils that are shallow to calcareous loam glacial till. These soils are steep to very steep, and they are in all townships of the county. In Montgomery County the Hennepin soils are mapped only in undifferentiated mapping units with Miamian soils.

A representative profile has a thin, dark grayish-brown silt loam surface layer about 4 inches thick. This is underlain by a thin, brown clay loam and loam subsoil. Brown, calcareous loam till is at a depth of about 12 inches.

The available moisture capacity of Hennepin soils is low. Their permeability is moderately slow. Hennepin soils have a shallow root zone and generally contain small amounts of organic matter. Their root zone is mostly neutral to mildly alkaline.

Areas of Hennepin soils generally are too steep for farming. They are wooded in most places.

Representative profile of a Hennepin silt loam, SW¼ SE¼ sec. 8, T. 3 N., R. 4 E.; German Township:

A1—0 to 4 inches, dark grayish-brown (10YR 4/2) silt loam, dark grayish brown (10YR 4/2) when rubbed; moderate, coarse, granular structure parting to moderate, fine and medium, granular structure; friable; neutral; clear, smooth boundary.

B2—4 to 8 inches, brown (10YR 4/3) clay loam; weak, medium, subangular blocky structure; firm; thin, very patchy, dark-yellowish-brown (10YR 3/4) clay films on horizontal and vertical ped faces; mildly alkaline; slightly calcareous; clear, wavy boundary.

B3—8 to 12 inches, brown (10YR 4/3) loam; weak, fine, subangular blocky structure; firm; mildly alkaline, moderately calcareous; clear, smooth boundary.

C—12 to 60 inches, brown (10YR 5/3) loam till; massive; friable; moderately alkaline; strongly calcareous.

The A horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), brown (10YR 4/3 and 10YR 5/3), and dark yellowish brown (10YR 4/4). Very dark grayish brown (10YR 3/2) is most common in wooded areas. The B horizon is brown (7.5YR 4/4), yellowish brown (10YR 5/4), or brown (10YR 4/3). It ranges from clay loam to loam. Some clay films occur in the B horizon in most places. The depth to calcareous soil material is 8 to 15 inches. Reaction is mostly neutral to moderately alkaline throughout the profile.

Hennepin soils are much shallower to calcareous till than Miamian soils and have a thinner subsoil. Structure is weaker and content of clay is less in the B horizon of Hennepin soils than in corresponding layers in Lewisburg soils. Hennepin soils are brighter colored throughout the profile and are better drained than Lewisburg soils.

Hennepin and Miamian silt loams, 18 to 25 percent slopes, moderately eroded (HeE2).—These soils are along the banks of the larger drainageways in the rolling moraines and along the valley walls of most of the streams in the county. Some areas of this mapping unit are dominantly Hennepin soils, some are dominantly Miamian soils, and in some areas both soils occur. The soils in this

mapping unit have a surface layer that is thinner than the surface layer of the profile described as representative for the Miamian and Hennepin series. Because the slope and erosion hazard are similar, these soils were not mapped separately. The Hennepin soil makes up about 50 percent of this mapping unit, the Miamian soil about 35 percent, and other soils about 15 percent.

Included in mapping are areas of Kendallville soils and of soils that are shallow to limestone or sand and gravel.

A severe erosion hazard is the major limitation of these soils to use for farming. The soils are generally too steep for cultivation, but they are well suited to pasture. Slope is the dominant limitation for many nonfarm uses. (Capability unit VIe–3)

Hennepin and Miamian silt loams, 25 to 50 percent slopes, moderately eroded (HeF2).—These soils are along banks of the larger intermittent drainageways and along valley walls of the larger streams in the county. Some areas of this mapping unit are dominantly Miamian soils, some are dominantly Hennepin soils, and in some areas both soils occur. Each soil is described under its respective series heading. These soils have a surface layer that is thinner than the surface layer of the profile described as representative for the Hennepin and Miamian series. Because the slope and erosion hazard are similar, these soils were not mapped separately. The Hennepin soil makes up about 55 percent of this mapping unit, the Miamian soil about 35 percent, and other soils about 10 percent.

Included in mapping are areas of a soil that is shallow to limestone or sand and gravel. Also included are small areas of escarpments.

The very steep slopes and the severe hazard of further erosion are the major limitations to use of these soils for farming. These soils are suited to pasture, but in the steeper areas the use of some kinds of modern machinery is hazardous. The steep slopes are also a limitation for many nonfarm uses. (Capability unit VIIe–1)

Hennepin and Miamian soils, 18 to 50 percent slopes, severely eroded (HmF3).—These soils are on banks of the larger intermittent drainageways and along valley walls of most of the larger streams in the county. Some areas of this mapping unit are dominantly Miamian soils or Hennepin soils, and in some areas both soils occur. Each soil is described under its respective series heading. Because the slope and erosion hazard are similar, these soils were not mapped separately. The profile of these soils is similar to that described as representative for the Hennepin and Miamian series, except that the surface layer and, in many places, the subsoil have been lost through erosion, and gullies are common. In many areas of these soils, the surface layer is calcareous loam till, and in other areas it is a clay loam. In both kinds of areas, the soils are poor for growing plants. The Hennepin soils make up about 50 percent of this mapping unit, the Miamian soils about 35 percent, and other soils about 15 percent.

Included in mapping are areas of soils that are shallow to limestone or sand and gravel.

The steep and very steep slopes and the severe hazard of further erosion are the major limitations to use of these soils for farming. This mapping unit can be used for pasture, but growth of forage plants typically is slow. Slope and erosion are also the dominant limitations for many nonfarm uses. (Capability unit VIIe–1)

Kendallville Series

The Kendallville series consists of well-drained soils that formed partly in loamy glacial outwash and partly in the underlying, calcareous loam glacial till. These soils are nearly level to sloping and occur in upland areas of till plains and moraines.

A representative profile has a dark-brown silt loam plow layer about 9 inches thick. The subsoil extends to a depth of 36 inches and is brown silty clay loam, reddish-brown clay loam, and reddish-brown sandy clay loam. Underlying the subsoil is yellowish-brown, calcareous loam till.

Kendallville soils have a medium available moisture capacity. Permeability is moderately slow in the underlying compact till and moderate in the uppermost 2 to 3 feet of the soils. The root zone is moderately deep to deep, but most roots grow above the underlying compact till. The root zone is strongly acid or medium acid unless limed. Acidity decreases as depth increases.

The Kendallville soils are mostly cultivated. They are well suited to crops. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow. Some of the steeper areas of these soils are used for woodland and pasture.

Representative profile of a Kendallville silt loam, SW¼NE¼ sec. 28, T. 3 N., R. 5 E., 1,850 feet west of Union Road and 1,300 feet north of the Warren County line in Jefferson Township:

Ap—0 to 9 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; medium acid; abrupt, smooth boundary.

B1t—9 to 15 inches, brown (7.5YR 4/4) silty clay loam; moderate, fine, subangular blocky structure; firm; thin, continuous, dark-brown (7.5YR 3/4) clay films on ped surfaces; slightly acid; clear, smooth boundary.

IIB2t—15 to 26 inches, reddish-brown (5YR 4/4) clay loam; moderate, fine and medium, subangular blocky structure; firm; medium, continuous, dark reddish-brown (5YR 3/4) clay films on ped surfaces; 30 to 35 percent sand and common rounded pebbles; slightly acid; clear, smooth boundary.

IIB3t—26 to 36 inches, reddish-brown (5YR 4/4) sandy clay loam; weak, coarse, subangular blocky structure; firm; thick, dark-brown (7.5YR 3/4) clay films on vertical faces of peds; small lenses of sand present; neutral; clear, smooth boundary.

IIIC—36 to 60 inches, yellowish-brown (10YR 5/4) loam; massive; firm; mildly alkaline to moderately alkaline, calcareous.

The A horizon is brown (10YR 4/3), dark grayish brown (10YR 4/2), and dark brown (10YR 4/3). The B horizon ranges from 5YR to 10YR in hue, is 3 or 4 in value, and is 4 in chroma. It is clay loam, sandy clay loam, or gravelly clay loam. The depth to carbonates is 24 to 38 inches. The IIB3 horizon formed in weathered outwash. The greatest acidity of the solum is in the B1 horizon or upper part of the B2 horizon and ranges from strongly acid to slightly acid. In about 20 percent of the acreage of Kendallville soils, thin layers of calcareous gravel occur between the part of these soils formed in outwash and the part formed in till.

Kendallville soils are adjacent to Miamian, Hennepin, and Fox soils. The uppermost 20 to 40 inches of Kendallville

soils formed in loamy outwash material, but the corresponding part of Miamian soils did not. Kendallville soils are much thicker and more developed than Hennepin soils, which are shallow to till. They lack the substratum of calcareous sand and gravel that is characteristic of Fox soils.

Kendallville silt loam, 0 to 2 percent slopes (KeA).—This soil occurs throughout the county in areas of different sizes on the uplands adjacent to or near stream terraces. Tilth is generally good, but crusting is a concern unless management is optimum.

Included in mapping are small areas of well-drained Miamian and Fox soils.

This soil has no major limitations to use for farming. It is well suited to row crops because the hazard of erosion is little or none. Moderately slow permeability is a limitation for some nonfarm uses. (Capability unit I-1)

Kendallville silt loam, 2 to 6 percent slopes (KeB).—This soil occurs throughout the county in small areas on the uplands near stream terraces. It is easy to till but is subject to surface crusting.

Included in mapping are small areas of Miamian soils.

In cultivated areas the hazard of erosion is moderate. Surface runoff is rapid where this soil is steepest. Slope and moderately slow permeability are limitations for some nonfarm uses. (Capability unit IIe-3)

Kendallville silt loam, 6 to 12 percent slopes, moderately eroded (KeC2).—This soil occupies small areas on the breaks between uplands and stream terraces. It has a profile similar to the one described as representative for the series, except that it has been eroded so much that the plow layer is a mixture of the original surface layer and the brown subsoil. As a result, the surface layer is sticky and harder to till than that of an uneroded Kendallville soil.

Included with this soil in mapping are small areas of Miamian soils. Also included are a few areas that are severely eroded. These eroded areas are indicated by a special symbol on the soil map.

A severe hazard of erosion is the major limitation to use of this soil for cultivated crops. Surface runoff is rapid. Slope and moderately slow permeability are limitations for some nonfarm uses. (Capability unit IIIe-1)

Landes Series

The Landes series consists of deep, well-drained soils that formed in sandy sediments on flood plains. They are nearly level and occupy flood plains scattered along most of the streams in the county.

In a representative profile, the surface layer is very dark grayish-brown sandy loam, very dark brown fine sandy loam, and black silt loam that combined are 19 inches thick. This layer is neutral or mildly alkaline. The layer between depths of 19 and 42 inches is fine sandy loam, loamy sand, and sandy loam, and it contains fine gravel. It is dark yellowish brown or dark brown. The material below a depth of 42 inches is mostly sand, but some gravel is present.

Landes soils are subject to periodic flooding. They have a low available moisture capacity, and crops are likely to be damaged by drought in dry years. Permeability is rapid, and the root zone is deep. It is mostly neutral to mildly alkaline.

The Landes soils are mostly cultivated. They are suited to crops after the period of flooding in winter and spring. The main crops grown are corn, oats, soybeans, and grass-legume meadow.

Representative profile of Landes sandy loam, NW1/4 SW1/4 sec. 29, T. 2 N., R. 5 E.; German Township:

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) sandy loam, mostly from recent depositions; massive; friable; mildly alkaline; calcareous; abrupt, smooth boundary.

A11—6 to 13 inches, very dark brown (10YR 2/2) fine sandy loam that appears to be an old surface layer; weak, fine, granular structure; friable; mildly alkaline; slightly calcareous; clear, wavy boundary.

A12—13 to 19 inches, black (10YR 2/1) silt loam; weak, very fine, subangular blocky structure; friable; mildly alkaline; slightly calcareous; clear, wavy boundary.

C1—19 to 26 inches, dark yellowish-brown (10YR 3/4) fine sandy loam; massive; friable; common, very dark brown (10YR 2/2) worm casts; thin line of fine gravel along upper boundary; mildly alkaline; slightly calcareous; clear, wavy boundary.

C2—26 to 32 inches, dark-brown (10YR 3/3) sandy loam; massive; friable; mildly alkaline; slightly calcareous; clear, wavy boundary.

C3—32 to 42 inches, dark yellowish-brown (10YR 3/4) loamy sand. few, fine, faint, yellowish-brown (10YR 5/6) mottles; massive; friable; mildly alkaline and calcareous; abrupt, wavy boundary.

IIC4—42 to 60 inches, sand; single grain; loose; 10 to 20 percent gravel; mildly alkaline; strongly calcareous.

The Ap horizon is generally sandy loam. The A12 horizon is sandy loam, fine sandy loam, or silt loam. The texture between depths of 10 and 40 inches is dominantly sandy loam and fine sandy loam, and there are a few strata of silt loam and loam. The weighted average clay content between these depths is 12 to 15 percent.

The A horizon is very dark grayish brown (10YR 3/2), black (10YR 2/1), very dark brown (10YR 2/2), or dark brown (10YR 3/3). The C horizon is dark yellowish brown (10YR 4/4 and 3/4), brown (10YR 4/3), and dark grayish brown (10YR 4/2). Where Landes soils are adjacent to Medway soils, faint, grayish mottles occur below a depth of 30 inches.

Landes soils are neutral to mildly alkaline in the uppermost 18 inches. They are calcareous to the surface in some places, but they are generally calcareous at a depth of more than 18 inches. Depth to calcareous sand or sand and gravel ranges from about 40 to 60 inches.

Landes soils generally are adjacent to well-drained Ross soils. They are sandier than the Ross and Medway soils. Landes soils are better drained than Medway soils, which are mottled at a depth of 18 to 24 inches. They are less gravelly than the Lanier soils.

Landes sandy loam (Ld).—This is a nearly level soil on flood plains throughout the county. It commonly occurs next to areas of finer textured Ross soils.

Included in mapping are small areas of Ross soils. Also included are some gravelly areas and a sandier area. These inclusions are indicated on the soil maps by a special symbol.

A flood hazard is the dominant limitation to farm or nonfarm use of this soil. Because this soil is droughty, it is best suited to crops that mature early in summer. (Capability unit IIw-4)

Lanier Series

The Lanier series consists of dark-colored, well-drained soils that formed in recent alluvium that is shallow over

mixed sand and gravel. These soils are nearly level and occupy flood plains of streams throughout the county.

A representative profile has a very dark grayish-brown sandy loam and silt loam surface layer about 15 inches thick. Under this is a dark-brown sandy loam layer that extends to a depth of 20 inches. Strata of sand and gravel are between depths of 20 and 50 inches.

Lanier soils have a very low available moisture capacity, and crops are likely to be damaged by drought even in years of normal rainfall. Permeability is rapid. The root zone is mostly shallow. These soils are neutral to mildly alkaline and are calcareous throughout. Most areas are wooded, and some areas are used for corn, oats, soybeans, and grass-legume meadow.

Representative profile of Lanier sandy loam, NW¼ SW¼ sec. 7, T. 4 N., R. 5 E.; Madison Township:

A11—0 to 10 inches, very dark grayish-brown (10YR 3/2) sandy loam; weak, fine, granular structure; friable; mildly alkaline; calcareous; clear, smooth boundary.

A12—10 to 15 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, subangular blocky structure; friable; mildly alkaline; calcareous; clear, smooth boundary.

IIC1—15 to 20 inches, dark-brown (10YR 4/2) sandy loam; massive; friable; thin streaks of pale brown (10YR 6/3); mildly alkaline; calcareous; abrupt, smooth boundary.

IIIC2—20 to 50 inches, sand and gravel; single grain; loose; mildly alkaline; calcareous.

The soil material from a depth of 10 inches to about 20 inches is dominantly sandy loam, coarse loam, or silt loam. Depth to sand and gravel ranges from 16 to 24 inches. The A horizon is very dark grayish brown (10YR 3/2), dark brown (10YR 3/3), and very dark brown (10YR 2/2). The C horizon is dark grayish brown (10YR 4/2), brown (10YR 4/3), very dark grayish brown (10YR 3/2), dark brown (10YR 4/2), and dark yellowish brown (10YR 4/4). The surface layer is neutral to mildly alkaline and is slightly calcareous. The underlying layers are mildly alkaline and more strongly calcareous as depth increases.

These soils are adjacent to well-drained Ross and Landes soils. They are sandier than Ross and Medway soils and have a gravelly substratum that is absent in Landes soils. Lanier soils are better drained than Medway soils, which are mottled at a depth of 18 to 24 inches.

Lanier sandy loam (Lg).—This is a nearly level soil on flood plains. It is shallower to sand and gravel than the nearby Landes soils and is much more droughty. Flooding is likely in winter and spring.

This soil commonly occurs next to areas of Ross soils, and small areas of those deeper, more silty soils are included in mapping.

Flooding is the dominant limitation to farm and nonfarm use of this soil. The very low available moisture capacity also is a limitation. (Capability unit IIw-4)

Lewisburg Series

The Lewisburg series consists of well drained to moderately well drained soils that formed in calcareous loam glacial till. These soils are shallow to calcareous till. They are gently sloping and occupy uplands in the northwestern part of Perry Township.

A representative profile has a dark-brown silt loam plow layer about 7 inches thick. The uppermost 5 inches of the subsoil is brown clay, and the next 3 inches is brown clay loam. Firm, calcareous loam glacial till underlies the subsoil at a depth of 15 inches.

Lewisburg soils have a moderately deep to shallow root zone. The available moisture capacity is low to medium, and permeability is moderately slow. The root zone of Lewisburg soils is medium acid in some places, but it is dominantly neutral. The soils are less acid as depth increases.

Most areas of Lewisburg soils are cultivated. The main crops grown are corn, wheat, oats, soybeans, and grass-legume meadow. Some areas are wooded, and some are in pasture.

Representative profile of Lewisburg silt loam, 2 to 6 percent slopes, NW¼SE¼ sec. 7, T. 5 N., R. 4 E.; Perry Township:

Ap—0 to 7 inches, dark-brown (10YR 4/3) silt loam; weak, fine and medium, granular structure; friable; many roots; neutral; abrupt, smooth boundary.

B2t—7 to 12 inches, brown (10YR 4/3) clay; moderate, medium, subangular blocky structure, firm; medium, continuous dark grayish-brown (10YR 4/2) clay films on ped faces; neutral; clear, smooth boundary.

B3t—12 to 15 inches, brown (10YR 4/3) clay loam; weak, medium, subangular blocky structure, firm; thin, patchy, dark-brown (10YR 4/3) clay films on ped surfaces, mildly alkaline; calcareous; abrupt, smooth boundary.

C—15 to 60 inches, yellowish-brown (10YR 5/4 and 5/8) loam; massive; firm; grayish-brown (10YR 5/2) vertical seams or streaks; moderately alkaline; strongly calcareous in till.

The A horizon ranges from brown (10YR 4/3) to dark grayish-brown (10YR 4/2). A thin, dark-brown (10YR 3/3) horizon occurs in some wooded areas. Where the solum is of maximum thickness, a thin B1 horizon is commonly present. In many places the B1 horizon has been incorporated into the plow layer. The B2t horizon ranges from dark yellowish brown (10YR 4/4) to brown (10YR 4/3) or dark brown (10YR 3/3). It is clay or clay loam. The A and B2t horizons are slightly acid to neutral, and the B3t horizon is neutral to mildly alkaline. The B2t horizon ranges from 2 to 8 inches in thickness. Depth to carbonates ranges from 7 to 18 inches.

The Lewisburg soils are adjacent to Pyrmont and Brookston soils and have better natural drainage than those soils. Lewisburg soils have little or no silt capping, and they have thinner subsoil layers and a shallower depth to underlying glacial till than the moderately well drained Celina soils. They are slightly less well drained than Hennepin soils and have more clay in the subsoil.

Lewisburg silt loam, 2 to 6 percent slopes (LsB).—This soil occupies low undulating ridges of variable size. The plow layer of this soil is subject to surface crusting.

Included in mapping are small areas of wetter Pyrmont and Brookston soils along the shallow drainageways. Also included are areas of Lewisburg soils that are eroded so much that the present plow layer is a mixture of the original surface layer and the upper part of the subsoil. These eroded areas are slightly lower in content of plant nutrients and in available moisture capacity, and more careful timing of farm operations is required because tilth is not so good as it is in uneroded areas.

A moderate erosion hazard is the major limitation to use of this soil for farming. Moderately slow permeability and slope are limitations for some nonfarm uses. (Capability unit IIe-3)

Lorenzo Series

The Lorenzo series consists of dark-colored, well-drained soils that formed in loamy glacial outwash. These

soils are shallow to calcareous sand and gravel. They are nearly level to moderately steep.

In a representative profile, the surface layer is very dark grayish-brown loam about 6 inches thick. The subsoil is dark-brown light clay loam and gravelly clay loam about 11 inches thick. Both the surface layer and subsoil contain some pebbles. Brown, calcareous sand and gravel is at a depth of about 17 inches.

Lorenzo soils have a very low available moisture capacity. Permeability is moderately rapid, and the root zone is shallow. The root zone is most commonly neutral to mildly alkaline.

Most areas of Lorenzo soils are wooded.

Representative profile of a Lorenzo loam, SW¼NE¼ sec. 32, T. 4 N., R. 4 E.; Jackson Township:

A1—0 to 6 inches, very dark grayish-brown (10YR 3/2) loam; moderate, fine, granular structure; friable; many roots; neutral; clear, smooth boundary.

B1—6 to 11 inches, dark-brown (7.5YR 3/2) light clay loam; moderate, fine, granular structure; firm; clay bridging between sand grains in lower part; many roots; some pebbles; neutral; abrupt, smooth boundary.

B2t—11 to 17 inches, dark-brown (7.5YR 3/4) gravelly clay loam; weak, fine, subangular blocky structure; firm; thin, continuous, brown (7.5YR 4/4) clay films on ped surfaces; neutral; weakly calcareous in places; clear, smooth boundary.

C—17 to 60 inches, brown (7.5YR 4/4) sand and gravel; single grain; loose; moderately alkaline; strongly calcareous.

The A horizon is dark brown (7.5YR 3/2, 7.5YR 3/3, and 10YR 3/3) and very dark grayish brown (10YR 3/2). These colors lighten very little when the material is rubbed. The B horizon is dark reddish brown (5YR 3/3 and 3/4), reddish brown (5YR 4/4), dark brown (7.5YR 3/2 or 3/4), and brown (7.5YR 4/4). It is light clay loam, gravelly clay loam, or sandy clay loam. The B horizon is medium acid to neutral. Depth to calcareous sand and gravel ranges from 10 to 24 inches.

The profile described as representative for the series is an uneroded inclusion in an area of Rodman and Fox soils. In Montgomery County, Lorenzo soils are only mapped in complexes with Rodman soils. The Rodman soil is described under the heading "Rodman Series."

The Lorenzo soils are adjacent to Fox, Rodman, and Kendallville soils. Lorenzo soils are darker colored than Fox and Kendallville soils and are not weathered so deeply. They have a clay loam subsoil in contrast to Rodman soils in which the A horizon is underlain by calcareous sand and gravel.

Lorenzo-Rodman complex, 4 to 12 percent slopes, moderately eroded (LxC2).—These soils are on the rolling stream terraces along the larger streams in the county. Any mapped area of these soils consists of about 50 percent Lorenzo soils, about 40 percent Rodman soils, and 10 percent inclusions of deeper, lighter colored soils. The Lorenzo and Rodman soils occur in such an intricate pattern that it is not practical to map them in separate units. These soils have a profile that differs from the one described as representative for their respective series by having a thinner loam surface layer as a result of erosion. As a result of the loss of surface soil through erosion, the available moisture capacity of these soils is very low and the content of available nutrients is low.

A very severe hazard of erosion is the major limitation to use of these soils for cultivated crops. In addition, they are very droughty. Slope is a limitation for some nonfarm uses. (Capability unit IVe–2)

Lorenzo-Rodman complex, 12 to 18 percent slopes, moderately eroded (LxD2).—These soils are on terraces along the larger streams in the county. Any mapped area of these soils consists of about 50 percent Lorenzo soils, about 40 percent Rodman soils, and about 10 percent inclusions of similar though light-colored soils. These soils occur in such an intricate pattern that it is not practical to map them as separate units. They have a profile that differs from the one described as representative for their respective series by having a thinner loam surface layer because of loss through erosion. This loss results in a very low available moisture capacity and less available nutrients than in the uneroded soil.

Included in mapping are small areas of severely eroded soils that have lost all of the surface layer. These areas are indicated on the soil maps by a special symbol.

These soils are poorly suited to cultivated crops. Pasture growth is limited by droughtiness. A severe erosion hazard is the dominant limitation to use of these soils for farming. Slope and droughtiness are limitations for some nonfarm uses. (Capability unit VIe–1)

Made Land

Made land (Mb) consists of sanitary land fills and small, highly mixed spots outside of built-up areas. The original soil profile has been altered or buried. These areas contain a mixture of soil material and underlying material, and they commonly contain foreign material, such as masonry or trash. The value of areas of Made land for farming or engineering differs, and an onsite investigation should be made before this land type is used for these purposes. (Capability unit not assigned)

Medway Series

The Medway series consists of dark-colored, moderately well drained soils that formed in recent alluvium. Medway soils are nearly level and lie on bottom lands along streams. They are the major soils on flood plains along the smaller streams in the county.

A representative profile has a very dark grayish-brown silt loam plow layer about 9 inches thick. Between depths of 9 and 16 inches, there are layers of very dark grayish-brown silt loam and dark-brown loam. The subsurface layer is dark-brown loam about 4 inches thick. The subsoil is dark grayish-brown loam and dark grayish-brown sandy loam. It is between depths of 20 and 33 inches and is mottled with grayish brown and yellowish brown. The underlying material consists of strata of strong-brown and dark-gray heavy sandy loam that extend to a depth of 45 inches. Gravelly sand is below a depth of 45 inches.

Medway soils are subject to periodic flooding, most commonly in winter and spring. The available moisture capacity is high, and permeability is moderate. Runoff is slow because these soils are nearly level and occur on flood plains. They are neutral to mildly alkaline.

The Medway soils are well suited to cultivated crops and are mostly cultivated. The main crops are corn, oats, soybeans, and grass-legume meadow, but some areas are used as woodland and for pasture.

Representative profile of Medway silt loam, NW¼NE¼ sec. 18, T. 4 N., R. 5 E., 790 feet east of Nolan Road and

2,000 feet north of Wolf Creek Pike in the field just north of Wolf Creek; Madison Township:

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam, very dark grayish brown (10YR 3/2) when rubbed; weak, fine, granular structure; friable; mildly alkaline; weakly calcareous; abrupt, smooth boundary.

A11—9 to 13 inches, very dark grayish-brown (10YR 3/2) silt loam, very dark grayish brown (10YR 3/2) when rubbed; weak, fine, granular structure; friable; mildly alkaline; weakly calcareous; clear, smooth boundary.

A12—13 to 16 inches, dark-brown (10YR 3/3) loam, dark brown (10YR 3/3) when rubbed; weak, fine, subangular blocky structure; friable; mildly alkaline; weakly calcareous; clear, smooth boundary.

A3—16 to 20 inches, dark-brown (10YR 3/3) loam, dark brown (10YR 3/3) when rubbed; few, fine, faint, yellowish-brown (10YR 5/4) mottles; massive; friable; mildly alkaline; weakly calcareous; clear, smooth boundary.

B1—20 to 29 inches, dark grayish-brown (10YR 4/2) loam that has common, fine, faint, grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/4) mottles; massive; friable; mildly alkaline; moderately calcareous; abrupt, smooth boundary.

B2—29 to 33 inches, dark grayish-brown (10YR 4/2) heavy sandy loam that has common, medium, distinct, grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/6) mottles; massive; friable; mildly alkaline; moderately calcareous; clear, smooth boundary.

C1—33 to 36 inches, strong-brown (7.5YR 5/6) heavy sandy loam that has many, medium, distinct, grayish-brown (10YR 5/2) mottles and few, fine, distinct, brown (10YR 5/3) mottles; massive; friable; moderately alkaline; weakly calcareous; clear, smooth boundary.

C2—36 to 45 inches, dark-gray (10YR 4/1) heavy sandy loam that has very dark gray (10YR 3/1) streaks; massive; friable; moderately alkaline; weakly calcareous; clear, smooth boundary.

IIC3—45 to 60 inches, gravelly sand; single grain; loose; moderately alkaline and calcareous.

When the A horizon is moist, it ranges from black (10YR 2/1) to dark brown (10YR 3/3) when broken and from very dark grayish brown (10YR 3/2) to dark brown (10YR 3/3) when rubbed. When this horizon is dry, it is grayish brown (10YR 5/2) and brown (10YR 5/3) when broken or rubbed. The A horizon ranges from 20 inches to about 30 inches in thickness. The upper part of the A horizon is silt loam, but the lower part is silt loam or loam. Depth to mottling ranges from 16 inches to about 28 inches. The reaction is neutral to mildly alkaline. In many places free carbonates are present in the A horizon. The B horizon is sandy loam, loam, silt loam, or light silty clay loam that occurs in layers of variable thickness or in discontinuous lenses. The profile described as representative for the series is on the coarse side of the range of the series.

Medway soils are adjacent to Ross and Shoals soils. They are less well drained than Ross soils but are better drained and darker colored than Shoals soils. Medway soils contain less sand and gravel than Landes or Lanier soils. They are better drained than Algiers soils and have a dark-colored surface layer.

Medway silt loam (Md).—This is a nearly level soil that lies on flood plains in fairly long, relatively narrow areas. Tilth is generally good.

Included in mapping are areas of a soil that has a light-colored surface layer. Also included are soils that have a loam surface layer. Other inclusions are areas where a sandy or gravelly substratum occurs at a depth of as little as 30 inches.

Flooding is a major hazard to use of this soil for farming. Flooding largely restricts farming to summer crops because it is a hazard in winter and spring. It is a serious hazard to many nonfarm uses. In some areas where flooding is frequent or severe, this soil is better suited to permanent grass or trees than to other uses. (Capability unit IIw-4)

Miamian Series

The Miamian series consists of well-drained soils that formed either wholly or partly in calcareous glacial till. The upper part of most Miamian soils is a capping of silt or loess that ranges from 0 to 18 inches in thickness. These soils are nearly level to very steep. They occupy upland areas of till plains and moraines in all parts of the county.

A representative profile has a brown silt loam plow layer about 7 inches thick. The upper part of the subsoil is 3 inches of dark yellowish-brown silty clay loam. In descending order, the subsoil from a depth of 10 to 30 inches is dark yellowish-brown clay, dark yellowish-brown clay loam, and yellowish-brown loam. Below the subsoil, at a depth of about 30 inches, is calcareous loam glacial till that is dense and compact.

Miamian soils have a medium available moisture capacity and moderately slow permeability. The compact calcareous till tends to limit roots to a moderate depth. The root zone is strongly acid in the uppermost 1½ feet in some places, but it is less acid as depth increases.

Miamian soils that are not too steep or eroded are well suited to farming. Many areas of these soils are cultivated. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow. Some areas, especially where the soils are steepest, are in permanent pasture and trees.

Representative profile of Miamian silt loam, 0 to 2 percent slopes, SE¼SW¼ sec. 13, T. 6 N., R. 5 E., 725 feet west and 480 feet north of the intersection of Meeker Road and Frederick Pike; Butler Township:

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; weak, medium and coarse, granular structure; friable; many roots; slightly acid; abrupt, smooth boundary.

B1t—7 to 10 inches, dark yellowish-brown (10YR 4/4) silty clay loam; strong, medium, subangular blocky structure; firm; thin, patchy, dark-brown (10YR 4/3) clay films; common roots; slightly acid; clear, wavy boundary.

IIB21t—10 to 17 inches, dark yellowish-brown (10YR 4/4) clay; strong, medium and coarse, subangular blocky structure; firm; thin, continuous, brown (7.5YR 4/4) clay films; common roots; strongly acid; clear, smooth boundary.

IIB22t—17 to 24 inches, dark yellowish-brown (10YR 4/4) clay loam; strong, coarse, subangular blocky structure; very firm; thin, continuous, dark-brown (7.5YR 3/2) clay films; common roots; medium acid; clear, irregular boundary.

IIB3—24 to 30 inches, yellowish-brown (10YR 5/4) loam; weak, coarse, subangular blocky structure; firm; thick, continuous vertical dark-brown (10YR 3/3) clay flows; common till pebbles; common roots in clay flows, few roots in matrix; clay flows neutral; mildly alkaline and calcareous in matrix; diffuse, wavy boundary.

IIC1—30 to 36 inches, yellowish-brown (10YR 5/4) loam; massive; firm; common, unweathered till pebbles; few, medium, continuous, vertical, dark-brown (10YR 3/3) clay flows; few roots along clay flows; moderately alkaline; calcareous; diffuse, smooth boundary.

HC2—36 to 60 inches, yellowish-brown (10YR 5/4) loam till; massive; firm; moderately alkaline; strongly calcareous.

The A horizon is dark grayish brown (10YR 4/2), brown (10YR 4/3), or dark yellowish brown (10YR 4/4). The B horizon has a hue of 7.5YR or 10YR, values of 3 to 5, and chromas of 3 to 5. The weighted average clay content of the upper 20 inches of the B2t horizon ranges from 35 percent to about 45 percent; the most common range is 36 to 42 percent. The depth to calcareous material ranges from 18 to 40 inches, and the most common range is 24 to 37 inches. Reaction of the B1 horizon or the upper part of the B2 horizon ranges from strongly acid to slightly acid.

The nearly level to strongly sloping Miamian soils are adjacent to Celina and Crosby soils, and the steep and very steep Miamian soils are adjacent to Hennepin soils. Miamian soils have a brighter overall color than Celina or Crosby soils, and they have a more clayey, thicker subsoil than Hennepin soils. The upper horizons of Miamian soils formed in loess or till, whereas the upper horizons of Kendallville soils formed in outwash material.

Miamian silt loam, 0 to 2 percent slopes (MlA).—This soil has the profile described as representative for the series. It is in narrow strips of rolling areas where nearby steep slopes provide good lateral drainage. It is also on broad till plains, where it is underlain by fractured limestone bedrock or other porous material at a depth of 6 to 10 feet. Surface runoff is slow, and the erosion hazard is little or none.

This soil is commonly next to areas of the moderately well drained Celina soils, and small areas of those soils are included in mapping.

This soil has no major limitations to use for cultivated crops. Moderately slow permeability is a limitation for some nonfarm uses. (Capability unit I–1)

Miamian silt loan, 2 to 6 percent slopes (MlB).—This soil occupies areas on ridges, slopes adjacent to waterways, and crests of steeper hills. It generally has good tilth, but it normally is low in organic-matter content and is susceptible to surface crusting.

Included in mapping are small areas having limestone bedrock within a depth of 40 inches; these areas mostly occur where this soil is adjacent to Milton soils. In some places small areas of the moderately well drained Celina soils are also included.

Because surface runoff is medium to rapid, the hazard of erosion is moderate in cultivated areas. Slope and moderately slow permeability are limitations for some nonfarm uses. (Capability unit IIe–3)

Miamian silt loam, 2 to 6 percent slopes, moderately eroded (MlB2).—This soil is in large, irregularly shaped areas of the undulating moraines and in smaller spots on the undulating till plains. It has a profile that is similar to the one described as representative for the Miamian series except that it is eroded. The plow layer is a mixture of the original surface layer and the upper part of the subsoil. Because these layers have been mixed, tilth is not so favorable as it is for an uneroded Miamian soil. Also, the organic-matter content is slightly less, and nutrients are not so plentiful. Good seedbeds are more difficult to prepare, and the available moisture capacity is less. Surface runoff is rapid.

Included in mapping are small areas of severely eroded soils on the knobs and shoulders of slopes. Also included, mostly where this soil is adjacent to Milton soils, are small areas where limestone bedrock is at a depth of less than 40 inches.

A moderate hazard of erosion is the major limitation to use of this soil for cultivated crops. Moderately slow permeability and slope are limitations for some nonfarm uses. (Capability unit IIe–3)

Miamian silt loam, 6 to 12 percent slopes, moderately eroded (MlC2).—This soil is in strips along drainageways on the moraines and dissected till plains. Erosion has removed so much of the original surface layer that the present plow layer is a mixture of the surface layer and subsoil. Consequently, this soil has poorer tilth, less available nutrients, and lower available moisture capacity than an uneroded Miamian soil.

Included in mapping are small areas that are severely eroded and some areas that are only slightly eroded. The severely eroded areas are those that have not been adequately vegetated, and the slightly eroded areas are mostly on short, wooded slopes along small drainageways. Also included are a few bouldery areas, which are indicated on the soil maps by a special symbol.

A severe hazard of erosion is the major limitation to use of this soil for farming. Slope and moderately slow permeability are limitations to many nonfarm uses. (Capability unit IIIe–1)

Miamian silt loam, 12 to 18 percent slopes, moderately eroded (MlD2).—This soil is in strips along the drainageways on the moraines and stream-dissected till plains. It is so eroded that material from the upper part of the subsoil has been worked into the surface layer by plowing, or the surface layer is so thin that such mixing would occur if this soil were plowed. This soil has less available moisture capacity than Miamian silt loam, 0 to 2 percent slopes. Plowed areas have poor tilth. Surface runoff is rapid.

A severe erosion hazard is the major limitation of this soil if it is used for cultivated crops. Moderately steep slopes and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IVe–1)

Miamian bouldery silt loam, 2 to 6 percent slopes (MmB).—This soil is in small, irregularly shaped, undulating areas where boulders occur. It has a profile similar to the one described as representative for the Miamian series, except that so many boulders are in the plow layer that modern equipment cannot be used efficiently for tilling row crops unless the boulders are removed. Boulders within the soil cause difficulty in earthmoving and trenching. This soil is suited to farming if the boulders are removed. They have been removed from many areas.

Included in mapping are small areas of bouldery, moderately well drained Celina soils.

A moderate hazard of erosion is the major limitation to use of this soil for cultivated crops. Boulders also are a limitation, but they can be removed. Moderately slow permeability and slope are limitations to some nonfarm uses. (Capability unit IIe–3)

Miamian clay loam, 2 to 6 percent slopes, severely eroded (MnB3).—This soil occupies small knobs and narrow strips on short slopes of the moraines. It is so eroded that most of the plow layer is made up of material from the subsoil. Tilth is poor, the structure of the exposed clay loam subsoil is unstable, and the surface is commonly puddled and crusted. The available moisture ca-

pacity and content of plant nutrients are lower than in uneroded Miamian soils. Runoff is rapid. Rills have started to cut into the soil, and these will later become gullies. Vegetation is difficult to establish on this soil because calcareous till is close to or at the surface.

Included in mapping are some small areas of a similar soil that has slopes of slightly more than 6 percent.

The major limitation to use of this soil for farming is a severe erosion hazard. Moderately slow permeability, slope, and erosion are limitations for some nonfarm uses. (Capability unit IIIe-1)

Miamian clay loam, 6 to 12 percent slopes, severely eroded (MnC3).—This soil is in narrow strips along waterways on the moraines and stream-dissected till plains. It is so eroded that most of the original surface layer is gone, and the plow layer is mostly clay loam from the subsoil. In many places the underlying calcareous glacial till is exposed at the surface.

The available moisture capacity and amount of plant nutrients are low. Surface tilth is poor. The structure of the exposed subsoil is unstable and raindrops effectively suspend soil particles, which are carried away in the runoff. Crusting of the surface is common. Rills have formed in many places, and gullies probably will form unless protective measures are taken. Some areas are gullied, and these are indicated on the soil maps with a special symbol. Vegetation is difficult to establish on this soil.

Erosion is the major limitation to use of this soil for farming. In cultivated areas the hazard of erosion is severe. Slope, erosion, and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IVe-1)

Miamian clay loam, 12 to 18 percent slopes, severely eroded (MnD3).—This soil is in strips along the small streams on the moraines and stream-dissected till plains. It is eroded so much that most of the original surface layer has been lost, and the subsoil is exposed in many places. Even the underlying calcareous till is exposed in some places. The available moisture capacity and content of plant nutrients are low. The exposed clay loam subsoil or loam glacial till is unstable and susceptible to further erosion. Crusting is common. Vegetation is difficult to establish, and plant cover is sparse.

Included in mapping are some gullied areas. These are indicated on the soil maps by a special symbol.

A severe erosion hazard is the dominant limitation to use of this soil for cultivated crops. Slope and severe erosion are the dominant limitations for many nonfarm uses. (Capability unit VIe-3)

Miamian-Urban land complex, undulating (MoB).—The soils in this mapping unit are on uplands and are underlain by glacial till. In most places the soils have been disturbed or buried by filling and other earthmoving operations. The undisturbed areas are commonly Miamian and Celina soils that are similar to those described as representative for their respective series.

Included in mapping are undisturbed spots of Russell, Xenia, Crosby, Fincastle, and Kendallville soils.

In most places the soils in this unit are moderately well drained and well drained and are underlain by compact, calcareous glacial till.

Surface runoff is generally rapid, and erosion is a serious hazard in disturbed areas. Siltation and pollution from construction sites are likely unless erosion control practices are used before and during construction. (Capability unit not assigned)

Miamian-Urban land complex, rolling (MoC).—The soils in this mapping unit are on uplands and are underlain by calcareous glacial till. Most of the soils have been disturbed or buried by filling and other earthmoving operations. The undisturbed spots are mainly a Miamian soil that has a profile similar to that described as representative for the series.

Included in mapping are undisturbed spots of Russell and Kendallville soils.

The soils in this unit are mainly well drained. Surface runoff is rapid, and the erosion hazard is severe. The erosion hazard is particularly severe in areas developed for homes and other buildings. Siltation and pollution of drainageways are likely unless conservation practices are used before and during construction. Slope and moderately slow permeability are limitations for some nonfarm uses. (Capability unit not assigned)

Miamian-Urban land complex, steep (MoE).—The soils in this mapping unit are mainly well drained, are moderately steep and steep, occur on uplands, and are underlain by compact glacial till. In most places they have been so disturbed by earthmoving or other construction operations that soil characteristics have been obliterated and the soils cannot be precisely classified. The undisturbed spots are mainly a Miamian soil that has a profile similar to that described as representative for the series.

Included in mapping are undisturbed spots of Russell and Kendallville soils.

Moderately steep and steep slopes are the dominant limitation to use for farming. Surface runoff is very rapid, and the erosion hazard is very severe on construction sites and in other disturbed areas. On construction sites erosion control practices help to control sedimentation of adjacent drainageways and lower lying areas. (Capability unit not assigned)

Millsdale Series

The Millsdale series consists of dark-colored, very poorly drained soils that are moderately deep to limestone. These soils formed in 20 to 40 inches of calcareous glacial till over limestone and limestone interbedded with clay shale bedrock. Millsdale soils occupy uplands and are nearly level to gently sloping.

A representative profile has a silty clay loam surface layer about 14 inches thick. The upper 7 inches is very dark brown, and the lower part is very dark grayish brown. The subsoil is 22 inches thick. The upper part is 6 inches thick and consists of black silty clay loam. The lower part is mottled dark-gray or gray clay and silty clay. Limestone bedrock is at a depth of 36 inches.

Millsdale soils have a seasonal high water table during wet periods where they are not drained. They can be drained where depth to bedrock permits installation of tile. The available moisture capacity is medium, but in most years water is available from seepage. Permeability is moderately slow. Organic-matter content is high in the uppermost 10 to 14 inches. Millsdale soils are generally

neutral, but they are medium acid in the uppermost 1½ feet in some places.

Millsdale soils are mostly cultivated. If drained, they are well suited to farming. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow. Some areas are in pasture.

Representative profile of Millsdale silty clay loam, 0 to 3 percent slopes, NW¼SW¼ sec. 6, T. 2 N., R. 5 E.; German Township:

Ap—0 to 7 inches, very dark brown (10YR 2/2) silty clay loam; strong, fine and medium, granular structure; friable; neutral; abrupt, smooth boundary.

A3—7 to 14 inches, very dark grayish-brown (10YR 3/2) silty clay loam that has few, fine, faint, yellowish-brown (10YR 5/4) mottles; moderate, medium, blocky structure; firm; common dark-brown or black oxide concretions; slightly acid; clear, smooth boundary.

B21tg—14 to 20 inches, black (10YR 2/1) silty clay loam that has few, medium, distinct, yellowish-brown (10YR 5/4) mottles and few, very fine, distinct, yellowish-brown (10YR 5/8) mottles; weak, medium, prismatic structure; firm; thin, patchy, very dark gray (10YR 3/1) clay films on ped surfaces; neutral; clear, smooth boundary.

B22tg—20 to 30 inches, dark-gray (10YR 4/1) and dark grayish-brown (10YR 4/2) clay that has common, medium, distinct, yellowish-brown (10YR 5/4, 5/6) mottles and few, fine, prominent, yellowish-brown (10YR 5/8) mottles; very weak, coarse, subangular blocky structure; firm; thin, continuous, dark grayish-brown (10YR 4/2) clay films on ped surfaces; mildly alkaline; abrupt, smooth boundary.

IIB3—30 to 36 inches, gray (5Y 5/1) silty clay that has common, fine, distinct, olive (5Y 5/6) mottles and few, fine, prominent, yellowish-brown (10YR 5/8) mottles; massive; firm; many limestone fragments; mildly alkaline; strongly calcareous; abrupt, wavy boundary.

R—36 to 40 inches, limestone bedrock.

The A horizon is very dark brown (10YR 2/2) to very dark grayish brown (10YR 3/2), very dark gray (10YR 3/1), and black (10YR 2/1). The B horizon is dark grayish brown (10YR 4/2) to dark gray (10YR 4/1), grayish brown (10YR 5/2), black (10YR 2/1), and very dark gray (10YR 3/1). The uppermost part of the B horizon is black (10YR 2/1) in most places. The B horizon is clay, silty clay, or silty clay loam. Depth to bedrock ranges from 20 to 40 inches. The surface layer is medium acid to neutral. The horizons deeper in the profile are less acid as depth increases, and the lower part of the B2 horizon and the B3 horizon are neutral to mildly alkaline and calcareous.

Millsdale soils are adjacent to Milton and Randolph soils and are darker and more poorly drained than those soils. The Millsdale soils have limestone or calcareous clay shale bedrock at a depth of less than 40 inches, but the Brookston soils are underlain by calcareous loam till and have no bedrock within 40 inches of the soil surface.

Millsdale silty clay loam, 0 to 3 percent slopes (MrA).—This soil is nearly level or depressional and occupies areas adjacent to Milton soils. In a few places, this soil is gently sloping and is on the lower part of limestone hills. The plow layer has a narrow range of optimum moisture content for tillage. If plowed when it is too wet, this soil clods easily.

Seasonal wetness is the dominant limitation to use of this soil for farming and for many nonfarm uses. In the few gently sloping areas, erosion is a hazard. This soil can be drained by tile, but bedrock near the surface interferes with installation of tile in many places. (Capability unit IIIw-3)

Milton Series

The Milton series consists of well-drained soils that formed in 20 to 40 inches of glacial till over limestone bedrock. These soils occupy uplands and are nearly level to moderately steep.

A representative profile has a dark-brown silt loam plow layer about 5 inches thick. The subsurface layer is brown silt loam and is similar to the plow layer. These two layers combined are 9 inches thick. To a depth of 25 inches, the subsoil is brown silty clay loam. Below this is dark yellowish-brown clay that weathered from limestone. Limestone bedrock is at a depth of 28 inches.

Milton soils have a moderately deep root zone. The available moisture capacity is medium to low, depending on the depth to rock. Permeability is moderately slow. In some places these soils are medium acid to neutral in the uppermost 18 inches, but acidity decreases with depth.

Milton soils are mostly cultivated. They are suited to most crops grown in the county. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow. Some areas are pastured or wooded.

Representative profile of Milton silt loam, 2 to 6 percent slopes, NE¼NE¼ sec. 13, R. 8, T. 2; Mad River Township:

Ap—0 to 5 inches, dark-brown (10YR 4/3) silt loam; moderate, fine and medium, granular structure; friable; neutral; abrupt, smooth boundary.

A3—5 to 9 inches, brown (7.5YR 4/4) silt loam; weak, medium, platy structure parting to moderate, very fine, subangular blocky structure; friable; dark-brown (10YR 4/3) worm and root channels; medium acid; clear, smooth boundary.

B21t—9 to 14 inches, brown (7.5YR 4/4) silty clay loam; strong, very fine, subangular blocky structure; firm; thin, very patchy, dark yellowish-brown (10YR 4/4) clay films on ped surfaces; slightly acid; clear, smooth boundary.

B22t—14 to 19 inches, brown (10YR 4/3) silty clay loam; strong, fine and medium, subangular blocky structure; firm; thin, continuous, dark-brown (10YR 3/3) clay films on ped surfaces; slightly acid; gradual, smooth boundary.

B23t—19 to 25 inches, brown (7.5YR 4/4) silty clay loam; moderate, fine and medium, subangular blocky structure; firm; moderately thick, continuous, dark-brown (7.5YR 3/4) clay films on ped surfaces; slightly acid; clear, smooth boundary.

IIB24t—25 to 28 inches, dark yellowish-brown (10YR 4/4) clay, moderate, medium, subangular blocky structure; firm; thick, continuous, dark yellowish-brown (10YR 3/4) clay films on ped surfaces; 3 or 4 percent of horizon is limestone fragments; neutral; abrupt, smooth boundary.

R—28 to 35 inches, limestone bedrock.

Depth to limestone bedrock ranges from 20 to 40 inches. When the A horizon is moist, it is dark brown or brown (10YR 4/3), dark grayish brown (10YR 4/2), or dark brown (10YR 3/3); when the material is rubbed, the A horizon is brown (10YR 4/3), dark grayish brown (10YR 4/2), or dark yellowish brown (10YR 4/4). The matrix of the B horizon is 5YR to 10YR in hue, 4 in value, and 3 or 4 in chroma. Where the B horizon formed in till, it is heavy clay loam, silty clay loam, and silty clay. In some places the B horizon was derived from glacial drift and is directly above the limestone, and there is no intervening IIB horizon. In some areas there is a thin C horizon of glacial drift that has been influenced by limestone.

Milton soils are adjacent to Randolph, Ritchey, Plattville, Millsdale, and Miamian soils. The Milton soils are better drained than Randolph and Millsdale soils. They are underlain by limestone at a depth of 20 to 40 inches, but limestone

is at a depth of less than 20 inches under the Ritchey soils. Milton soils formed in thinner glacial till than Miamian soils. The surface layer of Milton soils is lighted colored than that of Plattville soils. The B horizon of Milton soils is not influenced by shale, as it is in the Wynn soils.

Milton silt loam, 0 to 2 percent slopes (MsA).—This soil occupies small, irregularly shaped areas on the tops of hills controlled by bedrock. These hills are on the till plain and on the rims of valleys cut into bedrock. The soil has a friable surface layer that is susceptible to crusting.

Included in mapping, where the till covering the limestone is thicker than 40 inches, are small areas of Miamian soils. In some places, where the bedrock is interbedded limestone and shale, the lower part of the subsoil is olive because of the influence of shale.

Bedrock near the surface is the major limitation to use of this soil for farming. The bedrock determines the depth of plant roots and the available moisture capacity. This bedrock also is a limitation for many nonfarm uses of this soil. Surface runoff is slow, so there is little or no hazard of erosion. (Capability unit IIs–1)

Milton silt loam, 2 to 6 percent slopes (MsB).—This soil is on the rims of valleys cut into bedrock and on the crests of bedrock-controlled hills of the till plain. It has the profile described as representative for the series. The surface layer is friable and easy to till, though it is susceptible to crusting.

Included in mapping are small areas of Miamian soils. Also included are areas of a soil that has rippable limestone and shale underneath it.

A moderate erosion hazard is the major limitation to use of this soil for farming. Surface runoff is medium to rapid. Limestone bedrock near the surface is a limitation for many nonfarm uses. (Capability unit IIe–5)

Milton silt loam, 2 to 6 percent slopes, moderately eroded (MsB2).—This soil is on the rims of valleys cut into bedrock and on the crests of bedrock-controlled hills of the till plain. Because of erosion and tillage, the plow layer is a mixture of the original surface layer and the finer textured subsoil. Consequently, the plow layer is generally lower in organic-matter content and is stickier than that of uneroded Milton soils. Also, the available nutrients are less and the available moisture capacity is lower. Tilth is not so good as for an uneroded Milton soil, and the surface is more likely to puddle and crust. Runoff is increased by the sealing of the surface. Seeds do not germinate so well as they do in uneroded Milton soils.

Included in mapping are some spots where limestone is at a depth of more than 40 inches. Also included are some severely eroded areas. These eroded areas are indicated on the soil maps by use of a special symbol. In some areas rippable limestone and shale are under this soil.

Surface runoff is mostly rapid, and erosion is a moderate hazard in cultivated areas. Bedrock near the surface is the dominant limitation for many nonfarm uses. (Capability unit IIe–5)

Milton silt loam, 6 to 12 percent slopes, moderately eroded (MsC2).—This soil is in narrow strips along the walls of valleys cut into bedrock around the sides of hills that are controlled by bedrock. The plow layer of this eroded soil is a mixture of the original surface layer and the finer textured subsoil. Consequently, available nutrients are less, and the available moisture capacity is lower than in an uneroded Milton silt loam. Also, tilth is not so good and the plow layer is stickier.

Included in mapping are small areas of the deeper Miamian soils and small areas of the shallower Ritchey soils that are fairly droughty.

Surface runoff is rapid, and the erosion hazard is severe in cultivated areas. Bedrock near the surface and slope are limitations for many nonfarm uses. (Capability unit IIIe–2)

Milton silt loam, 12 to 18 percent slopes, moderately eroded (MsD2).—This soil is in long, narrow areas along the walls of valleys cut into bedrock. It is eroded, and the surface layer has a higher clay content than uneroded Milton soils. Rills have cut into the subsoil in places. This soil has lost much of its organic-matter content and, with it, much of its readily available nutrients. This soil is droughty as a result of moderate depth to limestone and erosion.

Included in mapping are areas of shallow Ritchey soils that are more droughty than this soil.

Surface runoff is very rapid, and erosion is the dominant limitation to use for cultivated crops. Slope and the moderate depth to bedrock are limitations for most nonfarm uses. (Capability unit IVe–3)

Milton silty clay loam, 6 to 18 percent slopes, severely eroded (MtD3).—This soil is in narrow bands along the walls of valleys cut into bedrock. It is severely eroded, and all or most of the original surface layer has been lost. The limestone bedrock is exposed at the surface in a few places. The available nutrients and available moisture capacity are very low. Infiltration is slow, and runoff is rapid to very rapid. Plants are difficult to establish. This soil has slopes of 6 to 12 percent in most areas, though slopes are 12 to 18 percent in some places.

The steeper areas of this soil are less well suited to cultivated crops than where the slopes are 6 to 12 percent; even in the more nearly level areas, however, cultivation should be only occasional. This soil is better suited to permanent vegetation than to cultivated crops. Past erosion and the hazard of further erosion are the major limitations to use of this soil for farming, but droughtiness also is a limitation. Slope and bedrock near the surface are limitations for many nonfarm uses. (Capability unit IVe–3)

Milton-Urban land complex, undulating (MuB).—The soils in this mapping unit are on uplands and are nearly level and gently sloping. They are underlain by limestone and clay shale bedrock at a depth of less than 40 inches. In most places the soils in this unit have been disturbed by earthmoving. In the undisturbed spots, there are Milton soils that have a profile similar to the one described as representative for the series.

Included in mapping are undisturbed spots of the somewhat poorly drained Randolph and the shallow Ritchey soils.

The soils in this mapping unit are well drained in most places. Surface runoff is mostly medium in vegetated areas and is rapid on construction sites and in other disturbed areas. Surface runoff is slow in the nearly level areas, and there is little or no hazard of erosion. The hazard of erosion is severe in gently sloping areas that are undergoing nonfarm development. Use of conservation practices on construction sites helps to control silta-

tion and pollution downstream. Bedrock is at a depth of 20 to 40 inches and is a major hazard to use of these soils for buildings. (Capability unit not assigned)

Milton-Urban land complex, rolling (MuC).—The soils in this mapping unit are on uplands and are underlain by limestone or limestone and clay shale bedrock at a depth of less than 40 inches. In most places the soils in this mapping unit have been disturbed by earthmoving. The undisturbed spots are mainly a Milton soil that has a profile similar to the one described as representative for the series.

Included in mapping are undisturbed spots of Wynn and Ritchey soils.

The soils in this unit are well drained. Because these soils are rolling, surface runoff is rapid and the hazard of erosion is severe on construction sites and in other disturbed areas. Use of conservation practices at construction sites helps to minimize siltation and pollution downstream. Slope and bedrock near the surface are also limitations for construction. (Capability unit not assigned)

Milton-Urban land complex, hilly (MuD).—The soils in this mapping unit are moderately steep on uplands. Limestone and clay shale bedrock are at a depth of 20 to 40 inches. In most places the soils have been disturbed by earthmoving. The undisturbed spots are mainly a Milton soil that has a profile similar to the one described as representative for the series.

Included in mapping are undisturbed spots of the shallow Ritchey and Fairmount soils.

The soils in this unit are well drained and droughty. Because these soils have moderately steep slopes, surface runoff is rapid. Slope and bedrock near the surface are limitations to construction on these soils. Erosion is a very severe hazard on construction sites. Use of conservation practices on construction sites helps to minimize siltation and pollution of drainageways downstream. (Capability unit not assigned)

Montgomery Series

The Montgomery series consists of dark-colored, very poorly drained soils that formed in sediments of old lakes. These soils occupy depressional areas on outwash terraces and till plains.

A representative profile has a black silty clay loam plow layer about 8 inches thick. The upper part of the subsoil is about 9 inches thick and consists of black silty clay mottled with yellowish brown and light brownish gray. The lower part of the subsoil is between depths of 17 and 33 inches and is gray silty clay mottled with yellowish brown. Underlying the subsoil is greenish-gray and dark-gray clay mottled with yellowish brown.

Montgomery soils have a seasonal high water table and need artificial drainage for optimum crop growth. The available moisture capacity is high, and permeability is slow to very slow. The root zone is slightly acid or neutral.

Montgomery soils are mostly cultivated. Drained areas of these soils are well suited to crops. The main crops are corn and soybeans. Some areas, especially those not artificially drained, are in permanent pasture, and some areas are wooded.

Representative profile of Montgomery silty clay loam, NW¼SW¼ sec. 14, R. 7, T. 2, 925 feet east of Woodman Drive and 2,100 feet north of Patterson Road in the city of Kettering:

Ap—0 to 8 inches, black (10YR 2/1) silty clay loam; moderate, medium, granular structure; friable; neutral; abrupt, smooth boundary.

B21tg—8 to 17 inches, black (10YR 2/1) silty clay that has common, fine, distinct, yellowish-brown (10YR 5/4) mottles and common, fine, distinct, light brownish-gray (10YR 6/2) mottles; strong, medium, angular blocky structure; firm; medium, continuous, very dark gray (N 3/0) clay films on ped surfaces; neutral; clear, irregular boundary.

B22tg—17 to 33 inches, gray (5Y 5/1) silty clay that has many, fine, distinct, yellowish-brown (10YR 5/6 and 10YR 5/8) mottles; moderate, medium and coarse, angular blocky structure; firm; medium, patchy, very dark gray (5Y 3/1) clay films; black (10YR 2/1) krotovinas; neutral; diffuse, wavy boundary.

Cg—33 to 60 inches, greenish-gray (5GY 5/1) and dark-gray (5Y 4/1) clay that has few, fine, distinct, yellowish-brown (10YR 5/6) mottles; massive; firm; mildly alkaline and calcareous.

The A horizon is black (10YR 2/1), very dark brown (10YR 2/2), very dark gray (10YR 3/1), or very dark grayish brown (10YR 3/2). These dark colors extend from the surface to a depth of 11 to 20 inches, and in some profiles they are in the upper part of the B horizon. The B22 horizon is gray (5Y 5/1 or 5Y 6/1 and 10YR 5/1) and dark gray (10YR 4/1). The B horizon is silty clay or clay. Depth to the underlying calcareous clay material is 30 to 60 inches. The B horizon is slightly acid or neutral, and the C horizon is neutral to mildly alkaline.

The B horizon of Montgomery soils in this county contain illuvial clay, but this is not a characteristic of Montgomery soils in other survey areas. This feature does not alter use and management of these soils.

Montgomery soils are adjacent to Brookston soils on uplands and to Westland soils on stream terraces. They formed in clayey lake sediments and have a finer textured subsoil that contains less sand than the subsoil of Brookston or Westland soils. Montgomery soils lack glacial till or sand and gravel to a depth of 5 feet or more. They are more clayey in the subsoil than Sloan soils.

Montgomery silty clay loam (Mv).—This nearly level soil is in areas that differ in size and shape. The surface layer is high in organic-matter content, but the range of optimum moisture content for tillage is narrow. This soil packs easily if it is grazed or worked when wet.

Included in mapping are small areas of very poorly drained Westland soils that have a coarser textured subsoil. Also included are small areas of a soil that has thin layers of muck in the subsoil.

Seasonal wetness is the major limitation to use of this soil for farm and nonfarm purposes. Surface runoff is slow to ponded. Tile drainage works well in this soil, and surface ditches help to remove excess water from depressional areas. (Capability unit IIIw-1)

Ockley Series

The Ockley series consists of well-drained soils that formed in loess and loamy glacial outwash that is underlain with sand and gravel at a depth of 40 to 60 inches. These soils are nearly level and gently sloping. They occur on terraces in valleys of major streams.

A representative profile has a dark-brown silt loam plow layer about 9 inches thick. The subsurface layer is a brown silt loam 4 inches thick. The subsoil is between

depths of 13 and 48 inches and consists of dark yellowish-brown silty clay loam, brown clay loam, and dark-brown sandy clay. The substratum is calcareous brown sand and gravel.

Ockley soils are deep and have a deep root zone. The available moisture capacity is high, and permeability is moderate. These soils are mostly medium acid, but in some places they are strongly acid in the uppermost 18 inches. They are less acid as depth increases.

Ockley soils are mostly cultivated. They are well suited to row crops and specialty crops. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow. Some areas are used for nursery and truck crops.

Representative profile of Ockley silt loam, 2 to 6 percent slopes, SW¼NW¼ sec. 20, T. 2 N., R. 5 E., German Township:

Ap—0 to 9 inches, dark-brown (10YR 3/3) silt loam that is brown (10YR 4/3) when rubbed; moderate, fine and medium, granular structure; friable; medium acid; abrupt, smooth boundary.

A3—9 to 13 inches, brown (10YR 4/3) silt loam; moderate, fine, subangular blocky structure; friable; many dark-brown (10YR 3/3) coatings on ped surfaces; medium acid; clear, wavy boundary.

B21t—13 to 20 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, patchy, brown (10YR 4/3) clay films on ped surfaces; medium acid; clear, wavy boundary.

IIB22t—20 to 29 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, patchy, brown (10YR 4/3) clay films on ped surfaces; slightly acid; clear, smooth boundary.

IIB23t—29 to 40 inches, brown (7.5YR 4/4) clay loam; moderate, medium and coarse, subangular blocky structure; firm; medium, continuous, dark-brown (10YR 4/3) clay films on ped surfaces; few, black (10YR 2/1) oxide concretions; slightly acid.

IIB3t—40 to 48 inches, dark-brown (7.5YR 4/4) sandy clay; moderate, medium, subangular blocky structure; very firm; thick, continuous, dark-brown (7.5YR 3/4) clay films on ped surfaces; 5 percent gravel; slightly acid; clear, smooth boundary.

IIC1—48 to 54 inches, dark-brown (7.5YR 3/4) sand; single grain; loose; neutral; clear, smooth boundary.

IIC2—54 to 60 inches, brown (10YR 5/3) sand and gravel; single grain; loose; calcareous.

The Ap horizon is dark brown (10YR 3/3) or dark yellowish brown (10YR 3/4) if the soil material is not rubbed. If the material is rubbed, the value is one unit higher. The B horizon is brown (10YR 4/3), brown and dark brown (7.5YR 4/4), or dark yellowish brown (10YR 4/4). The B21t horizon is heavy silt loam or silty clay loam. The B22t and B23t horizons are silty clay loam, clay loam, sandy clay, and sandy clay loam. Depth to calcareous sand and gravel ranges from 40 to 60 inches. The A3 and B21t horizons range from strongly acid to slightly acid. The B22t and B23t horizons range from slightly acid to neutral.

Ockley soils are adjacent to Fox and Thackery soils. The Ockley soils are deeper to sand and gravel than the Fox soils and are better drained than the Thackery soils. They are similar to Wea soils but have a lighter colored surface layer. Ockley soils are lighter colored and better drained than the moderately well drained Tippecanoe soils.

Ockley silt loam, 0 to 2 percent slopes (OcA).—This soil is in large, irregularly shaped areas on terraces along the major streams and their larger tributaries. It has a friable silt loam plow layer.

Included in mapping are small areas of thinner Fox soils and small areas of a soil that has a dark-colored plow layer. Also included are small areas where the sand and gravel substratum is underlain by glacial till at a depth of 5 or 6 feet.

This is an important soil for farming. It has no major limitations to use for farming and only a few limitations for most nonfarm uses. (Capability unit I–1)

Ockley silt loam, 2 to 6 percent slopes (OcB).—This soil is in small spots and strips on the terraces along the major streams and their larger tributaries. It has the profile described as representative for the series.

Included in mapping are small areas of thinner Fox soils, small areas of a soil that has a dark-colored plow layer, and areas of Ockley soils that have slopes of more than 6 percent or that are eroded.

A moderate erosion hazard is the dominant limitation to use of this soil for cultivated crops. Slope is a limitation for some nonfarm uses. (Capability unit IIe–1)

Plattville Series

The Plattville series consists of dark-colored, moderately well drained to well drained soils. These soils formed in calcareous glacial till that is 20 to 40 inches thick over limestone or limestone interbedded with calcareous clay shale. The soils are on uplands and are gently sloping to sloping.

A representative profile has a very dark brown silt loam surface layer about 10 inches thick. The upper part of the subsoil is 7 inches thick and is very dark grayish-brown silty clay loam. The lower part of the subsoil is brown and yellowish-brown clay loam about 6 inches thick. Above the limestone bedrock, between depths of 23 and 27 inches, is olive-gray silty clay loam.

Plattville soils have a moderately deep root zone in most places. The available moisture capacity is medium to low, and permeability is moderately slow. These soils have a high organic-matter content in the surface layer and are mostly medium acid to neutral in the root zone.

Plattville soils are mostly cultivated. They are well suited to cultivated crops. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow. Some areas are used for permanent pasture.

Representative profile of Plattville silt loam, 2 to 6 percent slopes, SW¼SW¼ sec. 6, T. 2 N., R. 5 E., German Township:

Ap—0 to 7 inches, very dark brown (10YR 2/2) silt loam; weak, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A1—7 to 10 inches, very dark brown (10YR 2/2) silt loam, moderate, medium, granular structure; friable; neutral; abrupt, smooth boundary.

B1—10 to 17 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, medium and fine, subangular blocky structure; firm; neutral; clear, smooth boundary.

B2t—17 to 20 inches, brown (10YR 4/3) clay loam; weak, medium, subangular blocky structure; firm; thin, continuous, dark-brown (10YR 3/3) clay films on ped surfaces; neutral; clear, wavy boundary.

B3t—20 to 23 inches, yellowish-brown (10YR 5/4) light clay loam; weak, coarse, subangular blocky structure; firm; thin, patchy, dark-brown (10YR 3/3) clay films; many angular till pebbles; mildly alkaline; slightly calcareous; clear, smooth boundary.

IIC—23 to 27 inches, olive-gray (5Y 5/2) heavy silty clay loam; massive; firm; few thin streaks of light olive brown (2.5Y 5/6); mildly alkaline to moderately

alkaline; strongly calcareous; abrupt, smooth boundary.

IIR—27 to 30 inches +, fractured limestone bedrock.

In some areas Plattville soils have a thin loess mantle. The A horizon is very dark brown (10YR 2/2), dark brown (10YR 3/3), or black (10YR 2/1). The upper part of the B horizon is brown (10YR 4/3) or very dark grayish brown (10YR 3/2). The lower part of the B2 horizon and the B3 horizon are brown (10YR 4/3), dark yellowish brown (10YR 4/4), or yellowish brown (10YR 5/4). The B horizon is clay loam and silty clay loam and has less than 35 percent clay and more than 15 percent sand coarser than very fine sand. Depth to limestone or limestone and shale bedrock ranges from 20 to 40 inches. The B1 horizon and the upper part of the B2 horizon range from strongly acid to neutral.

The Plattville soils in this county are slightly better drained than Plattville soils elsewhere. They lack mottles that have a chroma of 2 in the B horizon. This slight difference has little effect on use and management of these soils.

Plattville soils are adjacent to Milton soils. They have a darker colored surface layer than Milton soils. Plattville soils have bedrock at a depth of 20 to 40 inches, whereas the moderately well drained Corwin soils have no underlying bedrock within 40 inches of the surface.

Plattville silt loam, 2 to 6 percent slopes (PlB).—This soil is in strips around hills where bedrock is close to the surface and in scattered, irregular areas elsewhere. It is generally on the lower parts of slopes, but in places it is in narrow bands on the upper parts of slopes where there is lateral movement of moisture from adjacent Miamian and Celina soils. This soil has very good tilth. It is easy to work but is more droughty than deeper soils nearby. Surface runoff is medium to rapid. This soil has the profile described as representative for the series.

Included in mapping are small areas that have less than 20 inches of soil over bedrock. Also included are areas where the surface layer is dark colored and 20 to 25 inches thick, and some areas of Corwin soils that formed in glacial till.

A moderate hazard of erosion is the major limitation to use of this soil for farming. Bedrock near the surface and slope are limitations for some nonfarm uses. (Capability unit IIe-5)

Plattville silt loam, 6 to 12 percent slopes (PlC).—This soil is on the lower parts of long slopes or where limestone bedrock is at a moderate depth. It has been slightly to moderately eroded, and enough of the surface layer has been lost in some areas that clayey material from the upper part of the subsoil has been mixed into the plow layer. Rill erosion is evident in some areas that have been heavily used as pasture. The physical and chemical properties of the eroded areas are different from those of the original surface layer. Available nutrients are less and available moisture capacity is lower than in uneroded areas.

Included in mapping are small areas of Corwin soils that formed in thicker glacial till. Other small included areas are shallow to limestone bedrock.

A severe hazard of erosion is the major limitation to use of this soil for farming. It is droughtier than deeper nearby soils. Bedrock near the surface and slope are limitations for many nonfarm uses. (Capability unit IIIe-2)

Pyrmont Series

The Pyrmont series consists of somewhat poorly drained soils that formed in calcareous loam glacial till. These soils are shallow to calcareous till material. They are nearly level and occupy upland areas in the northwestern part of Perry Township.

A representative profile has a dark grayish-brown silt loam plow layer about 7 inches thick. It has a thin, grayish-brown silt loam subsurface layer. The subsoil consists of about 7 inches of brown clay and clay loam mottled with yellowish brown and dark yellowish brown. Underlying the subsoil, at a depth of 16 inches, is very firm loam glacial till that is calcareous.

Pyrmont soils have a shallow to moderately deep root zone. The available moisture capacity is low. They have a seasonal high water table during winter and spring, and their permeability is moderately slow to slow. In the uppermost 12 inches, these soils are medium acid in some places but are commonly slightly acid to neutral.

Pyrmont soils are mostly cultivated. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow.

Representative profile of Pyrmont silt loam, 0 to 2 percent slopes, NW¼NW¼ sec. 7, T. 5 N., R. 4 E.; Perry Township:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

A2g—7 to 9 inches, grayish-brown (10YR 5/2) silt loam that has common, fine, faint, dark yellowish-brown (10YR 4/4) mottles; weak, fine and medium, subangular blocky structure; friable; slightly acid; abrupt, smooth boundary.

B21t—9 to 13 inches, brown (10YR 5/3 and 10YR 4/3) clay that has few, fine, faint, yellowish-brown (10YR 5/6) mottles and common, fine, faint, dark yellowish-brown (10YR 4/4) mottles; moderate, fine and medium, angular blocky structure; firm; thin, patchy, dark grayish-brown (10YR 4/2) clay films on peds; neutral; clear, wavy boundary.

B22t—13 to 16 inches, brown (10YR 4/3) clay loam that has common, fine, faint, grayish-brown (10YR 5/2) and dark yellowish-brown (10YR 4/4) mottles; moderate, fine and medium, angular and subangular blocky structure; firm; very dark grayish-brown (10YR 3/2) clay flows; thin, patchy, dark grayish-brown (10YR 4/2) films on peds; till pebbles and weathered limestone pebble remnants present; neutral to mildly alkaline; weakly calcareous; clear, wavy boundary.

C1—16 to 22 inches, brown (10YR 4/3) loam that has common, medium, faint, dark yellowish-brown (10YR 4/4) and dark grayish-brown (10YR 4/2) mottles; massive; very firm; few, vertical, very dark grayish-brown (10YR 3/2) clay flows in the upper 3 inches; moderately alkaline; strongly calcareous; gradual, smooth boundary.

C2—22 to 60 inches, brown (10YR 4/3) loam that has few, fine, faint, yellowish-brown (10YR 5/6) mottles: massive; very firm; light-gray (10YR 7/2) and grayish-brown (10YR 5/2) vertical seams of high carbonate content; moderately alkaline; strongly calcareous.

The A horizon is dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or dark grayish brown (2.5Y 4/2). The color of the B horizon is in a hue of 2.5Y or 10YR, a value of 3 to 5, and a chroma of 3 or 4. The B2 horizon is clay or clay loam. The A horizon is medium acid to neutral. The B2 horizon is slightly acid to mildly alkaline. The B2 horizon ranges from 2 to 7 inches in thickness. The depth to carbonates ranges from 7 to 18 inches. Thickness of horizons within the solum varies in direct relationship to the thickness of the solum. Where the solum is of minimum thickness, the B1 and B3 horizons are less than 1 inch thick or are absent. In some areas the grayish-brown A2 horizon is incorporated into the plow layer.

Pyrmont soils are adjacent to the moderately well drained Lewisburg soils and the dark-colored, very poorly drained Brookston soils. Pyrmont soils are shallower to calcareous till than are the Crosby soils.

Pyrmont silt loam, 0 to 2 percent slopes (PyA).—This soil is in scattered areas that are generally along the periphery of low, smooth ridges. It is generally slightly higher than adjacent, very poorly drained Brookston soils. The root zone of this soil is mostly shallow; it is limited by the dense, compact till. The plow layer has low organic-matter content, and tilth is generally poor. Cracks form readily in this soil as it dries. It is droughty in summer.

Included in mapping are small areas of Brookston soils, some of which are in narrow drainageways. Also included are some spots that are deeper to calcareous till than is normal for Pyrmont soils. Some included areas are moderately eroded.

Seasonal wetness is a limitation to use of this soil for farming. Ponding is a limitation only in depressional areas. Drainage by tile is slow. Surface drainage helps to insure optimum crop growth. Seasonal wetness and moderately slow to slow permeability are limitations for many nonfarm uses. (Capability unit IIw-3)

Quarries

Quarries (Qu) consist of open excavations from which limestone has been removed. The soil and other material overlying the desired bedrock have been removed. Such areas have no value for farming and little potential for other uses except recreation or wildlife. (Capability unit not assigned)

Randolph Series

The Randolph series consists of somewhat poorly drained soils that are mostly moderately deep to bedrock. These soils formed in glacial till over limestone or limestone imbedded with bedrock of calcareous clay shale. Randolph soils are nearly level and are in upland areas of till plains and moraines where the till is 20 to 40 inches thick over bedrock.

A representative profile has a dark grayish-brown silt loam plow layer about 10 inches thick. It has a thin, grayish-brown silt loam subsurface layer and a thin, yellowish-brown silt loam layer that is transitional to the subsoil. The subsoil extends to a depth of about 27 inches. It consists of yellowish-brown clay, brown clay, and dark yellowish-brown silty clay loam. Below the subsoil is calcareous silty clay loam glacial till. At a depth of 31 inches, limestone or clay shale bedrock occurs.

Randolph soils have a seasonal high water table during winter and spring. They can be drained, but tile is difficult to install in most places because of the bedrock near the surface. Randolph soils have a medium available moisture capacity and moderately slow permeability.

Most areas of Randolph soils are cultivated. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow. Some areas, especially those not artificially drained, are wooded.

Representative profile of Randolph silt loam, 0 to 2 percent slopes, SW¼NW¼ sec. 14, T. 6 N., R. 4 E., 500 feet east of Brookville-Phillipsburg Road and 1,600 feet south of Sweet Potato Ridge Road; Clay Township:

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; medium acid; abrupt, smooth boundary.

A2g—10 to 12 inches, grayish-brown (10YR 5/2) silt loam that has common, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, thin, platy structure parting to weak, granular structure; friable; few, fine, black (10YR 2/1) oxide concretions; medium acid; clear, smooth boundary.

B&A—12 to 14 inches, yellowish-brown (10YR 5/4) silt loam that has few, fine, faint, yellowish-brown (10YR 5/6 and 10YR 5/8) mottles; weak, fine, subangular blocky structure; friable; grayish-brown (10YR 5/2) silt coatings on 80 percent of surface of peds; common, fine, black (10YR 2/1) oxide concretions; slightly acid; clear, smooth boundary.

IIB21tg—14 to 20 inches, yellowish-brown (10YR 5/4) clay that has few, fine, faint, grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/6 and 10YR 5/8) mottles; moderate, medium, subangular blocky structure; firm; thin, continuous, grayish-brown (10YR 5/2) clay films; many, fine and medium, black (10YR 2/1) oxide concretions; slightly acid; clear, smooth boundary.

IIB22tg—20 to 23 inches, brown (10YR 4/3) clay that has common, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium and coarse, subangular blocky structure; firm; thick, continuous, dark grayish-brown (10YR 4/2) clay films; medium, very patchy, very dark grayish-brown (10YR 3/2) clay films; few, fine, black (10YR 2/1) oxide concretions; neutral; clear, smooth boundary.

IIB3tg—23 to 27 inches, dark yellowish-brown (10YR 4/4) silty clay loam that has common, fine, distinct, dark-gray (10YR 4/1) mottles; weak, medium, subangular blocky structure; firm; thick, continuous, dark-gray (10YR 4/1) clay films; medium, very patchy, very dark grayish-brown (10YR 3/2) clay films; few, fine, black (10YR 2/1) oxide concretions; mildly alkaline; weakly calcareous; clear, smooth boundary.

IIC—27 to 31 inches, yellowish-brown (10YR 5/4) light silty clay loam; massive; firm; medium, very patchy; very dark grayish-brown (10YR 3/2) and dark grayish-brown (10YR 4/2) clay flows from B3 horizon; medium, continuous, grayish-brown (2.5Y 5/2) calcium coatings on vertical cleavage planes; mildly alkaline; strongly calcareous.

IIIR—31 inches, limestone bedrock.

The B horizon is yellowish brown (10YR 5/4), dark yellowish brown (10YR 4/4), or brown (10YR 4/3). Depth to yellowish-brown (10YR 5/6 and 10YR 5/8) and grayish-brown (10YR 5/2) mottles is 8 to 12 inches. The B horizon is light clay, silty clay, heavy clay loam, and silty clay loam. Depth to limestone bedrock ranges from 20 to 40 inches, and depth to the C horizon is 18 to 36 inches. The B3 horizon is directly on the bedrock in some areas, and no intervening till is present. In some places Randolph soils have up to 18 inches of loess capping.

Randolph soils are adjacent to Milton and Millsdale soils. They have better natural drainage and a lighter colored surface layer than the Millsdale soils. Randolph soils are not so well drained as the Milton soils. Limestone or clay shale bedrock is at a depth of less than 40 inches in Randolph soils, but Crosby soils have no bedrock within 40 inches of the surface.

Randolph silt loam, 0 to 2 percent slopes (RcA).—This soil is in large, irregularly shaped areas on the tops of hills on the till plains and is in strips parallel to the rims of valleys cut into limestone bedrock. It has a low organic-matter content, and tilth is generally poor.

Included in mapping are small areas of Crosby soils, where bedrock is deeper than 40 inches, and small strips

of wetter Millsdale soils along depressional drainageways. Also included are a few areas where the soil is gently sloping.

Seasonal wetness is the major limitation to use of this soil for farming. Surface runoff is slow, and ponding of short duration is likely in the nearly level areas. Seasonal wetness, bedrock near the surface, and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIIw-2)

Ritchey Series

The Ritchey series consists of well-drained soils that are shallow to bedrock. These soils formed in calcareous glacial till and residuum from limestone and limestone interbedded with clay shale bedrock. Ritchey soils are on uplands and are gently sloping to very steep. Bedrock is at a depth of 10 to 20 inches.

A representative profile has a thin, dark grayish-brown silt loam surface layer over a thin, brown silt loam subsurface layer. These layers combined are 6 inches thick. The upper part of the subsoil is 6 inches thick and consists of dark yellowish-brown silty clay loam. Dark yellowish-brown silty clay is at depths between 12 and 15 inches. The lower part of the subsoil is 3 inches thick and is typically brown silty clay containing many limestone fragments. Below this layer, at a depth of about 18 inches, is limestone (fig. 11) or clay shale bedrock.

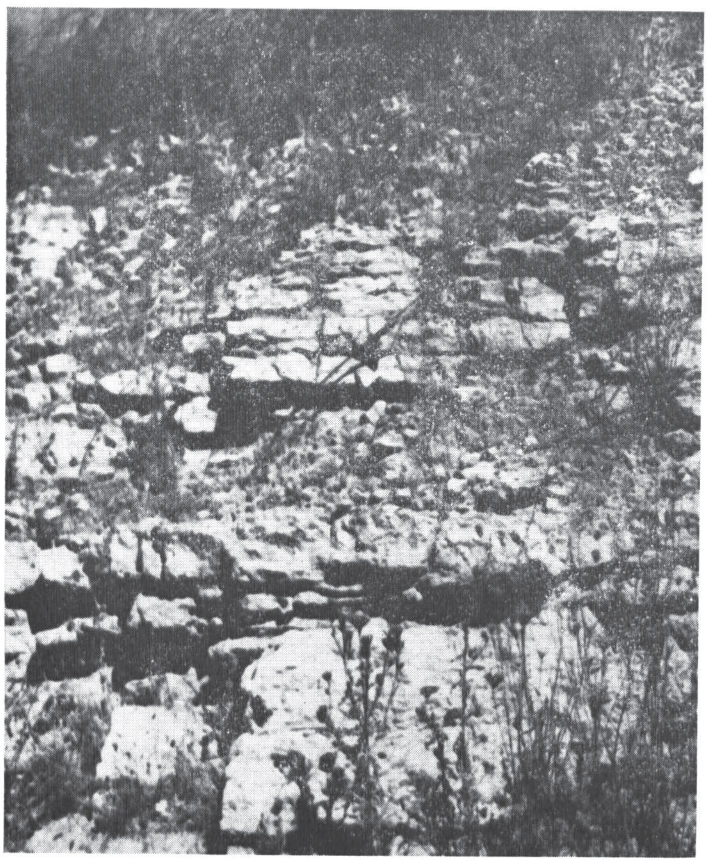

Figure 11.—**Limestone bedrock typical of Ritchey, Milton, Randolph, Plattville, and Millsdale soils.**

Ritchey soils have very low available moisture capacity, and they are droughty. Their root zone is shallow. These soils are medium acid to neutral in the upper part and neutral to moderately alkaline in the lower part. Ritchey soils have moderate permeability.

Most areas of Ritchey soils are used for pasture or are wooded. Some areas, especially where slopes are gentle, are cultivated.

Representative profile of Ritchey silt loam, 25 to 50 percent slopes, moderately eroded, NE¼SW¼ sec. 21, R. 6, T. 1, near West Carrollton; Miami Township:

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) silt loam; strong, medium and fine, granular structure; friable; many roots; neutral; clear, smooth boundary.

A3—3 to 6 inches, brown (10YR 4/3) silt loam; moderate, medium, subangular blocky structure; firm; very dark grayish-brown (10YR 3/2) wormcasts and root channels; many roots; medium acid; clear, smooth boundary.

B21t—6 to 12 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure parting to moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark grayish-brown (10YR 4/2) clay films; slightly acid; clear, smooth boundary.

B22t—12 to 15 inches, dark yellowish-brown (10YR 4/4) silty clay; strong, medium and coarse, subangular blocky structure parting to strong, fine, subangular blocky structure; firm; thin, continuous, dark yellowish-brown (10YR 3/4) clay films; neutral; clear, smooth boundary.

IIB23t—15 to 18 inches, brown (10YR 5/3) silty clay; moderate, medium, subangular blocky structure; firm; thin, continuous, dark yellowish-brown (10YR 3/4) clay films; common limestone fragments; moderately alkaline; calcareous; clear, smooth boundary.

IIR—18 inches +, limestone bedrock.

The A1 or Ap horizon is brown (10YR 4/3), dark grayish brown (10YR 4/2), or brown (10YR 5/3). In some undisturbed areas the uppermost 1 to 3 inches is very dark grayish brown (10YR 3/2) or very dark brown (10YR 2/2). The B horizon formed from glacial till and is 7.5YR or 10YR in hue, 3 to 5 in value, and 3 or 4 in chroma. The lower part of the B horizon formed from weathered limestone bedrock and has a hue of 7.5YR or 10YR, values of 3 to 5, and chromas of 2 to 4. The B horizon is heavy silty clay loam, heavy clay loam, clay, or silty clay. Thickness of the solum and depth to bedrock range from 10 to 20 inches. The upper part of the solum ranges from slightly acid to medium acid. The lower part of the solum is normally neutral or mildly alkaline.

The Ritchey soils in this county have a B horizon that is more clayey than that of Ritchey soils elsewhere. This is partly because the B horizon formed in calcareous clay shale or was influenced by the clay shale. The B horizon reflects the colors of the parent material and has a hue of 10YR, 2.5Y, or 5Y, a value of 4 or 5, and chromas of 3 to 6.

Ritchey soils are similar to the Milton, Fairmount, and Plattville soils. Ritchey soils have limestone bedrock at a depth of less than 20 inches, but limestone is more than 20 inches from the surface in the Milton and Plattville soils. The surface layer of Ritchey soils is lighter colored than that of the Fairmount or Plattville soils.

Ritchey silt loam, 2 to 6 percent slopes (ReB).—This soil occupies the upper part of slopes on bedrock-controlled hills. The silt loam surface layer is low in organic matter and is subject to crusting. The root zone of this soil is shallow.

Included in mapping are some areas where bedrock is more than 20 inches from the surface. A few included areas are nearly level.

Surface runoff is mostly medium, and erosion is a severe hazard in cultivated areas. Bedrock near the surface (fig. 12) is a dominant limitation for many nonfarm uses. (Capability unit IIIe–3)

Ritchey silt loam, 2 to 6 percent slopes, moderately eroded (ReB2).—This soil occupies narrow bands on the shoulders of slopes of the limestone hills. The available nutrients are less and the available moisture capacity in this soil are lower than for a less eroded Ritchey soil. The erosion of the surface layer and consequent mixing with the finer textured subsoil has resulted in a surface layer having lower organic-matter content and poorer tilth. This soil is subject to crusting. Seed germination is less certain, and seedling survival is poor.

Included in mapping are some areas that are severely eroded and some small rock outcrops.

The hazard of continuing erosion is the major limitation to use of this soil for farming. Droughtiness is a secondary limitation. The shallow depth to limestone is a limitation for many nonfarm uses. (Capability unit IIIe–3)

Ritchey silt loam, 6 to 12 percent slopes, moderately eroded (ReC2).—This soil is in narrow bands along the sides of limestone hills. The original surface layer has largely eroded away, and if this soil is tilled, the plow layer is a mixture of the surface layer and subsoil. The resultant surface layer has lower organic-matter content, less available nutrients, and lower available moisture capacity than a less eroded Ritchey soil.

Included in mapping are some small areas that are only slightly eroded. Also included are small areas of deeper Milton soils.

A very severe hazard of erosion is the major limitation to use of this soil for farming. Droughtiness is a secondary limitation and results from the shallow root depth. Shallow depth to bedrock and slope are limitations for many nonfarm uses. (Capability unit IVe–2)

Ritchey silt loam, 12 to 25 percent slopes, moderately eroded (ReE2).—This soil is in narrow strips along the sides of limestone bedrock valleys. It has a profile similar to the one described as representative for the Ritchey series, except that only a few inches of the silt loam surface layer remains. If this soil is tilled, the plow layer is a mixture of the surface layer and subsoil. Rills expose the subsoil in some places. The thin surface layer contains less organic matter and available nutrients than the surface layer of a less eroded Ritchey soil. The available moisture capacity is also slightly lower. Tilth is not so good as for uneroded or slightly eroded Ritchey soils.

Figure 12.—A Ritchey soil shallow over limestone. The area is in the boulder belt, and boulders are above outcrops of bedrock.

449-229—76——7

Included in mapping are areas of soils that are only slightly eroded and have a thicker surface layer. Also included are some severely eroded areas. These are indicated on the soil maps by a special symbol.

Surface runoff is very rapid, and there is a severe erosion hazard unless a thick plant cover is maintained. Droughtiness is a secondary limitation. This soil is very poorly suited to cultivated crops, but it is suited to pasture. Slope and shallow depth to bedrock are the dominant limitations for most nonfarm uses. (Capability unit VIe–2)

Ritchey silt loam, 25 to 50 percent slopes, moderately eroded (ReF2).—This soil is in strips along the sides of very steep hills and valley walls. It is eroded so much in places that only 1 or 2 inches of the brownish silt loam surface layer remains. This soil has the profile described as representative for the series.

Included in mapping are areas of soils that are severely eroded and have the clayey subsoil exposed in many places. Also included are small areas of rock outcrop. The severely eroded areas are indicated on the soil map by a special symbol.

Surface runoff is very rapid, and the erosion hazard is severe unless a thick plant cover is maintained. Operating equipment on the steeper slopes is extremely hazardous. Slope and shallow depth to rock are severe limitations for practically any use of this soil. (Capability unit VIe–2)

Ritchey silty clay loam, 6 to 18 percent slopes, severely eroded (RfD3).—This soil is in narrow strips along the sides of limestone bedrock valleys. It is so eroded that all the original dark grayish-brown silt loam surface layer is gone and the present surface layer is clayey subsoil material. The depth to bedrock is less than 10 inches in many places. The few inches of clayey subsoil remaining is very low in nutrients, organic-matter content, and available moisture capacity. Vegetation is generally scanty, and cover plants are hard to establish on this soil.

Included in mapping are gullied areas and rock outcrops.

A very severe hazard of further erosion is the major limitation to use of this soil for cultivated crops. The steeper areas of this soil are poorly suited to cultivated crops, and a thick plant cover helps to control erosion. Droughtiness is a serious secondary limitation. Slope, severe erosion, and shallow depth to bedrock are limitations for most nonfarm uses. (Capability unit IVe–2)

Riverwash

Riverwash (Rh) consists of stream deposits of sand, gravel, and cobblestones in and along the channels of the major streams. Little fine material is included in these deposits, and vegetation of any type is sparse. Flooding is common. (Capability unit not assigned)

Rodman Series

The Rodman series consists of dark-colored, well-drained soils that formed in loamy glacial outwash material. These soils are less than 12 inches thick over calcareous sand and gravel. They are gently sloping to very steep and are on terraces along streams. In Montgomery County the Rodman soils are mapped only in complexes with Lorenzo soils and in undifferentiated mapping units with Fox soils.

A representative profile has a surface layer of black loam over very dark grayish-brown gravelly loam that combined are about 10 inches thick. The next layer is calcareous, brown sand and gravel.

The available moisture capacity of Rodman soils is very low, and permeability is rapid. These soils are neutral to moderately alkaline.

Rodman soils are poorly suited to farming because they are very droughty. They are, however, a possible source of sand and gravel for construction. Rodman soils are mostly wooded or in permanent meadow.

Representative profile of a Rodman soil that has a loam surface layer, SW¼NE¼ sec. 4, R. 6, T. 1, city of Kettering:

A11—0 to 4 inches, black (10YR 2/1) loam; moderate, fine, granular structure; friable; 5 percent gravel, by volume; mildly alkaline; slightly calcareous; clear, smooth boundary.

A12—4 to 10 inches, very dark grayish-brown (10YR 3/2) gravelly loam; moderate, very fine, granular structure; friable; 40 percent gravel, by volume; mildly alkaline; slightly calcareous; clear, smooth boundary.

C—10 to 60 inches, brown (10YR 4/3) sand and gravel; single grain; loose; moderately alkaline; strongly calcareous.

The A horizon is black (10YR 2/1), very dark grayish brown (10YR 3/2), and very dark brown (10YR 2/2). Depth to calcareous sand and gravel is 8 to 12 inches, and the thickness of the dark surface layer coincides with this depth.

Rodman soils in Montgomery County have a higher content of carbonates than Rodman soils elsewhere. This difference does not greatly affect the use and management of the soils.

Rodman soils are adjacent to Lorenzo and Fox soils. They are thinner to sand and gravel than these adjacent soils, and they lack a B horizon enriched with illuvial clay. Rodman soils are darker colored than the Fox soils.

Rodman and Fox soils, 18 to 25 percent slopes, moderately eroded (RlE2).—These soils are in narrow strips on stream terraces and are in hilly gravelly areas of the uplands. Some mapped areas consist mostly of Rodman soils, some mostly of Fox soils, and some consist of both soils. These soils can be mapped separately, but they have such steep slopes that showing them separately would serve no useful purpose for use and management. Part of the surface layer of these soils has been lost through erosion. The present surface layer is loam or gravelly loam. Because these soils are thinner than those described as representative for the series, they have less available nutrients and lower available moisture capacity.

Included in mapping are areas of soils that have been severely eroded and have none of the original surface layer. A special symbol on the soil maps identifies these areas.

A very severe erosion hazard and droughtiness are the major limitations to use of these soils for pasture. These soils are better suited to permanent pasture or trees than to improved pasture, though slopes permit equipment to be operated for pasture improvement. Slope and droughtiness are the dominant limitations for most nonfarm uses. (Capability unit VIIe–2)

Rodman and Fox soils, 25 to 50 percent slopes, moderately eroded (RlF2).—The soils in this unit are very steep

and occur in narrow strips on stream terraces and on hilly, gravelly uplands. Some mapped areas consist mostly of Rodman soils, some mostly of Fox soils, and some consist of both soils. These soils could be mapped separately, but they have such steep slopes that showing them separately would serve no useful purpose for use and management. Part of the surface layer of these soils has been lost through erosion. Texture is loam or gravelly loam. These soils have less available nutrients and a lower available moisture capacity than the soils described as representative for the series. An uneroded profile of the Rodman part of this mapping unit is described as representative for the series.

Included with these soils in mapping are small areas of soils that have been severely eroded and have none of their original surface layer. A special symbol on the soil maps identifies these areas.

These soils are, in most places, too steep for use of ordinary tractors and other wheeled vehicles. They are better suited to permanent pasture or trees. Steep slopes are a severe limitation for most nonfarm uses. (Capability unit VIIe–2)

Ross Series

The Ross series consists of dark-colored, well-drained soils that formed in recent alluvium on flood plains. These soils are nearly level and occupy bottom lands. They are the dominant soils along the larger streams of the county and are common along the smaller streams.

A representative profile has a very dark grayish-brown plow layer about 8 inches thick. At depths between 8 and 22 inches is very dark grayish-brown and very dark brown silt loam that differs only slightly from the plow layer. Between depths of 22 and 56 inches, there are brownish layers of fine sandy loam, silt loam, and loam. Gravelly loamy sand is below a depth of 56 inches.

Ross soils have a high available moisture capacity. They are moderately permeable, but runoff is generally slow because these soils are nearly level. Where these soils are not protected from stream overflow, winter grains are occasionally damaged by flooding. Flooding most commonly occurs during winter and spring. Ross soils have a deep root zone in summer. The root zone is mostly neutral to mildly alkaline.

Most areas of Ross soils are cultivated. These soils are well suited to summer row crops. The main crops are corn, oats, soybeans, and grass-legume meadow. Some areas that are flooded frequently are used for pasture or trees.

Representative profile of Ross silt loam, SE¼SW¼ sec. 11, T. 3 N., R. 4 E., 1,150 feet west of Creek Road and 2,000 feet north of State Route 725; German Township:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; very weak, fine, granular structure; friable; many roots; mildly alkaline; slightly calcareous; abrupt, smooth boundary.

A11—8 to 13 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, medium, subangular blocky structure; friable; many roots; abundant very dark brown (10YR 2/2) wormcasts; mildly alkaline; slightly calcareous; abrupt, smooth boundary.

A12—13 to 22 inches, very dark brown (10YR 2/2) heavy silt loam; weak, medium and coarse, granular structure; friable; common roots; abundant wormcasts; mildly alkaline; slightly calcareous; clear, smooth boundary.

C1—22 to 34 inches, dark yellowish-brown (10YR 3/4) fine sandy loam; massive; friable; many, very dark brown (10YR 2/2) wormcasts that are fewer with depth; mildly alkaline; mildly calcareous; clear, smooth boundary.

C2—34 to 45 inches, dark-brown (10YR 3/3) silt loam; massive; friable; mildly alkaline; calcareous; clear, smooth boundary.

C3—45 to 56 inches, very dark grayish-brown (10YR 3/2) loam that has few, medium, faint, gray (10YR 5/1) mottles and few, fine, faint, dark yellowish-brown (10YR 4/4) mottles; massive; friable; common snail shells; moderately alkaline; strongly calcareous; clear, smooth boundary.

IIC4—56 to 60 inches, gravelly loamy sand; single grain; loose; calcareous.

The A horizon, when moist, ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2) or dark brown (10YR 3/3) if broken. It is very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) when rubbed. When the A horizon is dry, it is grayish brown (10YR 5/2) and brown (10YR 5/3) both when broken and when rubbed. The A horizon ranges from 20 inches to about 34 inches in thickness. Reaction is neutral to moderately alkaline throughout the profile and, in many places, free carbonates are present in the A horizon. The C horizon is loamy sand, sandy loam, loam, silt loam, light clay loam, or light silty clay loam. This material is in layers of variable thickness or in discontinuous lenses.

Some of the Ross soils in this county have less than the 24 inches of dark-colored material in the surface layer, which is outside the range as defined for the series. This difference does not alter the usefulness of the soils.

Ross soils are adjacent to Algiers, Medway, Landes, Lanier, and Shoals soils. Drainage is better for Ross soils than for Algiers, Medway, and Shoals soils, which are mottled at shallower depths. The Ross soils have a thicker dark-colored surface layer than Landes or Lanier soils and are finer textured throughout.

Ross silt loam (Rs).—This nearly level soil occupies broad areas of flood plains along the major streams and their tributaries. It has a friable plow layer that is high in content of organic matter. Tilth is generally good.

Included in mapping are some areas of soils that have a light-colored sandy loam surface layer. Also included are some small areas where the substratum is sandy or gravelly and is as shallow as 36 inches.

Except in areas protected by dikes or levees, this soil is subject to periodic flooding, particularly during winter and spring. Some small areas of this soil are rough and are cut up by overflow channels of the main stream. Sycamore, hackberry, red elm, and other trees have grown up in most places in these rough areas. Flooding is a serious limitation for most nonfarm uses of this soil, particularly for building sites. (Capability unit IIw–4)

Ross-Urban land complex (Rt).—The soils in this mapping unit are nearly level and occur on flood plains. These soils have been developed, along with adjacent soils on terraces or uplands, for residential or industrial use. Most of the acreage in this mapping unit has been disturbed by filling or other earthmoving operations. The disturbed material is alluvial, and filled areas are underlain by alluvium. Small spots of undisturbed soils are in this unit, and in most places they are Ross soils that have a

profile similar to the one described as representative for the series.

Included in mapping are areas of Medway and Landes soils.

The major limitation to use of these soils is the hazard of occasional stream overflow in unprotected areas. (Capability unit not assigned)

Russell Series

The Russell series consists of well-drained soils that formed in loess-capped loam glacial till. These soils are gently sloping to moderately steep and are in upland areas in the southeastern part of the county.

A representative profile has a dark grayish-brown silt loam plow layer 8 inches thick. The subsurface layer is brown silt loam 4 inches thick. The subsoil, between depths of 12 and 24 inches, is dark yellowish-brown silty clay loam. The lower part of the subsoil is brown clay loam that extends to a depth of 39 inches. It is underlain by calcareous yellowish-brown loam glacial till.

The available moisture capacity of Russell soils is high, and permeability is moderately slow. These soils have a deep root zone that is strongly acid or medium acid in the uppermost 18 inches. They are less acid as depth increases.

Russell soils are mostly cultivated. They are well suited to farming. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow.

Representative profile of Russell silt loam, 2 to 6 percent slopes, NW¼SW¼ sec. 14, R. 6, T. 2, 660 feet east of Bigger Road and 2,500 feet north of Alexandersville-Bellbrook Road; Washington Township:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

A3—8 to 12 inches, brown (10YR 4/3) silt loam; weak, fine, subangular blocky structure; friable; dark grayish-brown (10YR 4/2) wormcasts and silt coatings on ped surfaces; medium acid; clear, smooth boundary.

B21t—12 to 18 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, continuous, brown (10YR 4/3) clay films on ped surfaces; slightly acid; clear, smooth boundary.

B22t—18 to 24 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine and medium, subangular blocky structure; firm; thin, continuous, brown (10YR 4/3) clay films on ped surfaces; neutral; clear, wavy boundary.

IIB23t—24 to 29 inches, brown (10YR 4/3) clay loam; weak, fine and medium, subangular blocky structure; firm; thin, continuous, dark-brown (10YR 3/3) clay films on ped faces; black (10YR 2/1) oxide concretions; many angular till pebbles; neutral; clear, smooth boundary.

IIB3t—29 to 39 inches, brown (10YR 4/3) clay loam; weak, coarse, subangular blocky structure; firm; black (10YR 2/1) oxide concretions; very patchy, medium, dark-brown (10YR 3/3) clay films on vertical ped surfaces; neutral; clear, wavy boundary.

IIC—39 to 60 inches, yellowish-brown (10YR 5/4) loam; massive; friable; calcareous.

The loess ranges from 18 to 40 inches in thickness. The A horizon is dark grayish brown (10YR 4/2) and brown (10YR 4/3 and 10YR 5/3). The upper part of the Bt horizon is dark yellowish brown (10YR 4/4), and the lower part is brown (10YR 4/3 and 7.5YR 4/4). The upper part of the B horizon is silty clay loam, and the IIB horizon is clay loam. Depth to calcareous material ranges from 34 to 60 inches. The upper part of the B horizon and the lower part of the A horizon are strongly acid to slightly acid.

Russell soils are adjacent to Xenia, Fincastle, and Brookston soils and are better drained than any of these soils. Russell soils are capped with 18 to 40 inches of loess or silt, whereas Miamian soils are capped with less than 18 inches. They are deeper to bedrock than Wynn soils, which have limestone bedrock at a depth of less than 40 inches. The Russell soils are better drained and lighter colored than Dana soils.

Russell silt loam, 2 to 6 percent slopes (RuB).—This soil has the profile described as representative for the series. It is on long, linear ridge crests and in large, irregularly shaped areas on long slopes. It has a silt loam surface layer that is easily eroded.

Included in mapping are small areas of Miamian soils and small areas of nearly level Russell soils. Also included are areas that are moderately eroded and small areas of a soil that is underlain by calcareous silt that extends to a depth of 50 inches.

A moderate erosion hazard is the major limitation to use of this soil for cultivated crops. Slope and moderately slow permeability are limitations for some nonfarm uses. (Capability unit IIe–1)

Russell-Miamian silt loams, 6 to 12 percent slopes, moderately eroded (RvC2).—These soils are in strips along waterways and on the shoulders of slopes. Areas of these soils consist of about equal amounts of Russell and Miamian soils. The loess capping varies in thickness within short distances. Both the Russell and Miamian soils are moderately eroded, and both are susceptible to further erosion. Surface runoff is rapid.

Included in mapping are areas that are only slightly eroded.

A severe hazard of further erosion is the major limitation of these soils for cultivated crops. Slope and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIIe–1)

Russell-Miamian silt loams, 12 to 18 percent slopes, moderately eroded (RvD2).—These soils are in narrow strips adjacent to larger drainageways in rolling areas. The depth of the loess capping varies within short distances, and both Russell and Miamian soils occur in about equal acreages. Both soils are moderately eroded. Surface runoff is very rapid, and the surface layer is highly erodible.

Included in mapping are small, severely eroded areas.

A very severe hazard of further erosion is the major limitation to use of these soils for cultivated crops. Slope is the dominant limitation for many nonfarm uses. (Capability unit IVe–1)

Shoals Series

The Shoals series consists of poorly drained soils that formed in recent alluvium on flood plains. Shoals soils are nearly level and occupy areas of flood plains that are scattered throughout the county.

A representative profile of a Shoals soil has a dark grayish-brown silt loam surface layer about 8 inches thick. The subsoil is a dark grayish-brown silt loam that is about 5 inches thick and that has yellowish-brown and dark reddish-brown mottles. The underlying material,

between depths of 13 and 60 inches or more, is dark-gray and dark grayish-brown sandy loam and sandy clay loam that have very dark gray, yellowish-brown, and reddish-brown mottles.

Shoals soils have a seasonal high water table and are subject to flooding. They are high in available moisture capacity. Surface runoff is slow because the flood plain is nearly level. Artificial drainage helps to remove excess water, but adequate outlets for tile are difficult to obtain in some places. Shoals soils have moderate permeability. They have a deep root zone in summer when the water table is low. They are slightly acid to mildly alkaline in the upper 2 feet.

Most areas of Shoals soils are cultivated. The main crops are corn, oats, soybeans, and grass-legume meadow. Some areas are in pasture.

Representative profile of Shoals silt loam, NW¼SE¼ sec. 33, T. 4 N., R. 4 E., 1,700 feet west of Farmersville Road and 1,850 feet north of Manning Road; Jackson Township:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; mildly alkaline, calcareous; abrupt, smooth boundary.

Bg—8 to 13 inches, dark grayish-brown (10YR 4/2) silt loam with few, fine, distinct, dark reddish-brown (5YR 3/4), and yellowish-brown (10YR 5/4) mottles and few, medium, distinct, yellowish-brown (10YR 5/8) mottles; weak, fine, subangular blocky structure; friable; dark-gray (10YR 4/1) films on ped surfaces; very dark grayish-brown (10YR 3/2) wormcasts in upper part of horizon; mildly alkaline, calcareous; clear, smooth boundary.

C1g—13 to 22 inches, dark gray (10YR 4/1) sandy loam that has common, medium, distinct, yellowish-brown (10YR 5/6) mottles, few, medium, faint, very dark gray (10YR 3/1) mottles, and few, fine, prominent, yellowish-red (5YR 4/6) mottles; massive, friable; mildly alkaline, calcareous; clear, smooth boundary.

C2g—22 to 30 inches, dark-gray (10YR 4/1) and dark grayish-brown (10YR 4/2) sandy clay loam that has common, medium, distinct, reddish-brown (5YR 4/4) mottles; massive; firm; moderately alkaline, calcareous; clear, wavy boundary.

C3—30 to 60 inches, dark grayish-brown (10YR 4/2) sandy loam; massive; friable; moderately alkaline, calcareous.

The A horizon is dark grayish brown (10YR 4/2) or grayish brown (10YR 5/2). The C horizon has a hue of 10YR, values of 4 and 5, and chromas of 1 and 2. The texture of the C horizon is loam, sandy clay loam, clay loam, sandy loam, and silt loam. Reaction throughout the profile is slightly acid to moderately alkaline.

Shoals soils are adjacent to dark-colored Ross, Medway, and Sloan soils. They are lighter colored and more poorly drained than Ross and Medway soils. They are lighter colored and better drained than Sloan soils.

Shoals silt loam (Sh).—This nearly level soil is in narrow strips along small streams and around depressions on the flood plains of larger streams. It is subject to flooding, and it has a seasonal high water table. This soil has a deep root zone when the water table is low.

Included in mapping are small areas of dark-colored, very poorly drained Sloan soils and areas of soils that have a loam surface layer.

Seasonal wetness and flooding are major limitations of this soil for any use. Surface runoff is slow or ponded. (Capability unit IIw–1)

Sloan Series

The Sloan series consists of dark-colored, very poorly drained soils that are subject to flooding. Sloan soils are depressional to nearly level and occupy low-lying areas of flood plains throughout the county.

A representative profile of a Sloan soil has a black silt loam surface layer about 12 inches thick. The subsurface layer is very dark gray clay loam that is mottled with yellowish brown and brownish yellow and extends to a depth of about 20 inches. At a depth below 20 inches is dark-gray clay loam that is mottled mainly with yellowish brown. This layer is 5 inches thick and contains many rounded pebbles. Beneath this is more than 30 inches of dark grayish-brown gravelly loam that is mottled with yellowish brown.

Sloan soils are subject to flooding, and they have a seasonal high water table. They are high in available moisture capacity. Their permeability is moderately slow. Outlets for tile drainage are difficult to establish in some places because these soils are in a low position. The Sloan soils are slightly acid to mildly alkaline in the root zone. When the water table is low in summer, the root zone is deep.

Most areas of Sloan soils are cultivated. The main crops are corn, oats, soybeans, and grass-legume meadow.

Representative profile of Sloan silt loam, SE¼NE¼ sec. 4, R. 8, T. 2, 50 feet west of the Greene-Montgomery County line and 300 feet north of Chambersburg Road; Wayne Township:

Ap—0 to 9 inches, black (10YR 2/1) silt loam; weak, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A1—9 to 12 inches, black (10YR 2/1) silt loam with few, fine, distinct, dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/4) mottles; weak, coarse, subangular blocky structure; friable; neutral; clear, smooth boundary.

A3g—12 to 20 inches, very dark gray (10YR 3/1) clay loam that has a few, fine, distinct, yellowish-brown (10YR 5/4 and 5/8) and brownish-yellow (10YR 6/6) mottles; massive; firm; neutral; clear, smooth boundary.

B2g—20 to 25 inches, dark-gray (10YR 4/1) clay loam with few, fine, distinct, brown (10YR 5/3), yellowish-brown (10YR 5/4), and brownish-yellow (10YR 6/6) mottles; massive; firm; many rounded pebbles; mildly alkaline, slightly calcareous; clear, smooth boundary.

IIC—25 to 60 inches, dark grayish-brown (10YR 4/2) gravelly loam that has many, fine, distinct, yellowish-brown (10YR 5/4) mottles and few, fine, distinct, yellowish-brown (10YR 5/6 and 5/8) mottles; massive; 35 to 40 percent pebble content; very friable; mildly alkaline, calcareous.

The A horizon is black (10YR 2/1), very dark gray (10YR 3/1), very dark brown (10YR 2/2), or very dark grayish brown (10YR 3/2) to a depth of about 10 to 24 inches. The underlying alluvium (B and C horizons) is very dark gray (10YR 3/1), dark gray (10YR 4/1), and very dark grayish brown (10YR 3/2), and it becomes dark grayish brown (10YR 4/2) and brown (10YR 4/3) with depth. The B horizon has a weak and moderate, medium and coarse, subangular blocky structure, or it is structureless. The weighted average clay content in the B and C horizons to a depth of 40 inches is between 18 and 35 percent. The C horizon ranges in texture from gravelly loam to sandy loam or loam.

Sloan soils are adjacent to Ross and Medway soils on the larger flood plains and to soils such as Miamian and Celina soils on the smaller, more narrow flood plains. Sloan soils

have a darker colored surface layer and are more poorly drained than Shoals soils. The subsoil in Sloan soils lacks a Bt horizon and is less well developed than that of Brookston, Westland, and Montgomery soils. Sloan soils are dark colored at the surface, but Algiers soils have a layer of light-colored recent alluvium over dark-colored, very poorly drained material.

Sloan silt loam (So).—This nearly level soil is along the headwaters of small streams, in the elongated depressions along the valley slopes of larger flood plains, and in oval depressions on the flood plain. It has a seasonal high water table in winter and spring, and it dries out slowly in spring. Surface runoff is slow to ponded.

Included in mapping are areas that are calcareous throughout the profile and areas that have sand and gravel at a depth of 35 to 40 inches. Also included are areas on nearly level stream bottoms that have been developed along with adjacent terrace and upland areas for residential or industrial use. Most of these areas have been disturbed by earthmoving or fill operations.

Seasonal wetness and flooding are the major limitations of this soil for any use. (Capability unit IIIw-1)

Thackery Series

The Thackery series consists of moderately well drained soils that formed in glacial outwash material. They are nearly level and occupy areas on stream terraces.

A representative profile of a Thackery soil has a dark grayish-brown silt loam plow layer about 7 inches thick. Beneath the plow layer, to a depth of 15 inches, the upper part of the subsoil is dark yellowish-brown silt loam. The lower part of the subsoil is dark yellowish-brown silty clay loam, clay loam, and gravelly clay loam. The sand content increases with depth throughout the subsoil. At a depth of 40 to 50 inches, there are strata of loamy sand and sandy loam. Calcareous loam glacial till is below a depth of 50 inches.

Thackery soils have a deep root zone. They are medium to high in available moisture capacity. Permeability is moderate above the till substratum and moderately slow in the till. The root zone is commonly medium acid or slightly acid, but it is strongly acid in some places.

Most areas of Thackery soils are cultivated and are well suited to cultivated crops. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow.

Representative profile of Thackery silt loam, till substratum, 0 to 2 percent slopes, SE¼SE¼ sec. 21, T. 2 N., R. 5 E.; Miami Township:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; neutral; abrupt, smooth boundary.

B1—7 to 15 inches, dark yellowish-brown (10YR 4/4) heavy silt loam that has a moderate, fine, angular blocky structure; friable; medium acid; clear, smooth boundary.

B21t—15 to 23 inches, dark yellowish-brown (10YR 4/4) silty clay loam that has few, fine, faint, yellowish-brown (10YR 5/6) mottles; moderate, fine and medium, subangular blocky structure; firm; thin, patchy, dark yellowish-brown (10YR 3/4) clay films on ped surface; slightly acid; clear, smooth boundary.

B22t—23 to 30 inches, dark yellowish-brown (10YR 4/4) clay loam that has few, fine, faint, yellowish-brown (10YR 5/4 and 5/6) mottles; moderate, medium, subangular blocky structure; firm; 5 percent (by volume) fine gravel; thin, patchy, brown (10YR 4/3) clay films; slightly acid; clear, smooth boundary.

IIB3—30 to 40 inches, dark yellowish-brown (10YR 4/4) gravelly clay loam; massive, parting along vertical clay flows to weak, coarse, subangular blocky structure; firm; neutral; clear, smooth boundary.

IIC1—40 to 45 inches, brown (10YR 4/3) loamy sand; massive; friable; neutral; gradual, smooth boundary.

IIC2—45 to 50 inches, dark yellowish-brown (10YR 4/4) sandy loam; massive; friable; mildly alkaline, calcareous; gradual, smooth boundary.

IIIC3—50 to 60 inches, dark yellowish-brown (10YR 4/4) loam; massive; friable; strongly calcareous.

The A horizon is dark grayish brown (10YR 4/2) or brown (10YR 4/3). Color of the B horizon is dark yellowish brown (10YR 4/4) and brown (10YR 4/3 or 7.5YR 4/4). Weighted average clay content of the Bt horizon is 30 to 34 percent. The upper part of the B horizon is medium acid to slightly acid. Depth to the more sandy IIC horizon is 40 to 48 inches.

Thackery soils in Montgomery County have a till substratum that is not representative of that of the Thackery soils in most other survey areas. Typically, Thackery soils are formed in loess-capped loamy outwash over thick deposits of sand and gravel. In this county the till is at a depth of 50 to 70 inches. These soils also lack grayish mottles in the upper part of the Bt horizon as do typical Thackery soils elsewhere. Use and management of these soils, however, are commonly similar to those of the more typical Thackery soils.

Thackery soils are commonly adjacent to Ockley and Tippecanoe soils. They are not so well drained as Ockley soils, and they are lighter colored than the Tippecanoe soils.

Thackery silt loam, till substratum, 0 to 2 percent slopes (ThA).—This soil occupies irregularly shaped areas on nearly level terraces along streams. It has a calcareous loam glacial till substratum at a depth of 50 to 70 inches. This soil has a deep root zone and generally has good tilth in the surface layer. It has low to medium organic-matter content. It dries fairly early in spring and is well suited to a variety of crops, including specialty crops.

Included with this soil in mapping are small areas that have 2 to 4 percent slopes.

This soil has no major limitations for farming. It has few limitations for most nonfarm uses. (Capability unit I-1)

Tippecanoe Series

The Tippecanoe series consists of dark, moderately well drained soils that formed in loamy glacial outwash. They are nearly level and are on terraces along streams.

A representative profile of Tippecanoe soil has a very dark grayish-brown silt loam surface layer about 12 inches thick. The upper part of the subsoil is very dark grayish-brown, brown, and dark yellowish-brown clay loam mottled with brown and yellowish brown. This part extends to a depth of about 36 inches. The lower part of the subsoil is brown loam and loamy sand. Loose sand and gravel underlie the subsoil at a depth of about 52 inches.

Tippecanoe soils have a deep root zone and are medium acid to neutral. Available moisture capacity is medium to high, permeability is moderate, and the organic-matter content is moderately high to high.

Most areas of Tippecanoe soils are cultivated. They are well suited to field crops and specialty crops. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow.

A representative profile of Tippecanoe silt loam, 0 to 2 percent slopes, NE¼NW¼ sec. 17, T. 2 N., R. 5 E.; German Township (east):

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable; medium acid; abrupt, smooth boundary.

A1—7 to 12 inches, very dark grayish-brown (10YR 3/2) heavy silt loam; moderate, fine and very fine, subangular blocky structure; friable; slightly acid; clear, smooth boundary.

IIB21t—12 to 18 inches, very dark grayish-brown (10YR 3/2) clay loam that has few, fine, faint, brown (10YR 5/3) mottles; moderate, fine, subangular blocky structure; friable; thin, patchy, very dark brown (10YR 2/2) clay films on ped surfaces; slightly acid; gradual, smooth boundary.

IIB22t—18 to 25 inches, brown (10YR 4/3) clay loam that has few, fine, faint, yellowish-brown (10YR 5/4) mottles; moderate, coarse, subangular blocky structure; firm; thin, patchy, very dark grayish-brown (10YR 3/2) clay films on ped surfaces; slightly acid; clear, smooth boundary.

IIB23t—25 to 36 inches, dark yellowish-brown (10YR 4/4) clay loam that has few, fine, faint, brown (10YR 5/3) and yellowish-brown (10YR 5/4) mottles; moderate, very coarse, subangular blocky structure; firm; medium, patchy, dark grayish-brown (10YR 4/2) clay films; neutral; clear, smooth boundary.

IIB31—36 to 45 inches, brown (10YR 4/3) loam; weak, coarse, subangular blocky structure; friable; abundant, light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/4) weathered limestone remnants; mildly alkaline, slightly calcareous; clear, smooth boundary.

IIB32—45 to 52 inches, brown (10YR 4/3) loamy sand; single grain; loose; limestone remnants as in IIB31 horizon; moderately alkaline, calcareous; clear, smooth boundary.

IIC—52 to 60 inches, sand and gravel; single grain; loose; strongly calcareous.

The A horizon and the upper part of the B horizon are very dark grayish-brown (10YR 3/2) and very dark brown (10YR 2/2). The thickness of these dark layers ranges from 14 to 19 inches. The lower part of the B horizon is brown (10YR 4/3), dark yellowish brown (10YR 4/4), and yellowish brown (10YR 5/4). Weighted average clay content of the Bt horizon is 32 to 34 percent. The reaction of the upper part of the B horizon is medium acid to slightly acid. Horizons are progressively less acid with depth. Depth to calcareous sand and gravel is 46 to 60 inches.

Tippecanoe soils are adjacent to Warsaw, Fox, and Ockley soils. Tippecanoe soils are less well drained than these adjacent soils and have a darker surface layer than Fox or Ockley soils. They are deeper to sand and gravel than the Fox soils. Tippecanoe soils also are darker than the moderately well drained Thackery soils that also are adjacent in places.

Tippecanoe silt loam, 0 to 2 percent slopes (TpA).—This moderately well drained soil occupies small areas and narrow strips on stream terraces. It has a deep root zone and good tilth in the surface layer.

Included in mapping are a few small areas of wetter Westland and Sloan soils in narrow drainageways.

This soil is well suited to field crops and specialty crops. It has no major limitations for farming. Surface runoff is slow, and erosion is not a problem. This soil has few limitations for most nonfarm uses. (Capability unit I–2)

Urban Land

Urban land is mapped in three units in Montgomery County—Urban land, alluvial; Urban land, gravelly material; and Urban land, loamy material.

Urban land, alluvial (Ua).—This land type is nearly level and occurs on flood plains of the major streams. It consists largely of strata of silty and sandy materials and is underlain by recent stream alluvium.

Except for those areas that are protected from flooding by levees or other structures, this land type is subject to occasional flooding. Some areas of this land type have a seasonal high water table.

This land type has been developed for residential, business, and industrial use to the extent that most of the acreage is under roof and pavement. (Capability unit not assigned)

Urban land, gravelly material (Ug).—This land type is on terraces along the river. It is underlain by outwash sand and gravel.

This land type has been developed for residential, business, and industrial use to the extent that most of the acreage is under roof and pavement. New construction sites on this land type are a potential source of silt pollution in nearby drainageways unless conservation practices are used to help control erosion. Undisturbed areas tend to be droughty as a consequence of having limited depth to sand and gravel. (Capability unit not assigned)

Urban land, loamy material (Um).—This land type is on uplands and is underlain by glacial till or limestone bedrock. The glacial till is loamy but compact. Surface runoff is mostly medium to rapid.

This land type has been developed for residential, business, or industrial use to the extent that most of the acreage is under roof and pavement.

New construction sites on this land type are a potential source of silt pollution in nearby drainageways. Conservation practices in such areas help to control erosion. (Capability unit not assigned)

Warsaw Series

The Warsaw series consists of dark-colored, well-drained soils that formed in loamy glacial outwash that is underlain by sand and gravel at a depth of 24 to 42 inches. These soils are nearly level to gently sloping and are on stream terraces.

A representative profile of a Warsaw soil has a very dark grayish-brown silt loam surface layer about 6 inches thick. The upper part of the subsoil is very dark grayish-brown and very dark brown silty clay loam that extends to a depth of 15 inches. Below a depth of 15 inches, the subsoil is a dark yellowish-brown clay loam and gravelly sandy loam to a depth of 32 inches. Loose calcareous sand and gravel is at a depth of 32 inches and extends to a depth of more than 60 inches.

Warsaw soils have a medium to low available moisture capacity, depending on the overall depth to sand and gravel. Permeability is moderate above the sand and gravel substream and rapid in the substratum. The root zone in Warsaw soils is moderately deep. It is slightly acid to medium acid in the upper part and is less acid as depth increases.

Most areas of Warsaw soils are cultivated. They are well suited to field crops and specialty crops. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow.

Representative profile of Warsaw silt loam, 0 to 2 percent slopes, NE¼NE¼ sec. 21, R. 6, T. 1; Miami Township:

A1—0 to 6 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; slightly acid; clear, smooth boundary.

B1—6 to 11 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, fine, subangular blocky structure; firm; medium acid; abrupt, smooth boundary.

B21t—11 to 15 inches, very dark brown (10YR 2/2) silty clay loam; moderate, medium, subangular blocky structure; firm; slightly acid; clear, smooth boundary.

B22t—15 to 25 inches, dark yellowish-brown (10YR 4/4) clay loam; weak, medium, subangular blocky structure; firm; thin, continuous, dark-brown (10YR 3/3) clay films on ped surfaces; neutral; diffuse, smooth boundary.

B3—25 to 32 inches, dark yellowish-brown (10YR 4/4) gravelly sandy loam; massive; friable; very dark grayish-brown (10YR 3/2) clay flows; mildly alkaline, slightly calcareous; clear, wavy boundary.

C—32 to 60 inches, sand and gravel; single grain; loose; calcareous.

The A horizon is very dark brown (10YR 2/2) or very dark grayish brown (10YR 3/2). These colors extend to a depth of 12 to 20 inches and include the B1 horizon and the upper part of the Bt horizon. The lower part of the Bt horizon is dark yellowish brown (10YR 4/4) and brown (10YR 4/3 and 7.5YR 4/4).

The B2t horizon is clay loam, sandy clay loam, and silty clay loam. Depth to calcareous sand and gravel ranges from 24 to 42 inches, but a depth of 32 to 34 inches is typical. The B1 horizon is medium acid to slightly acid. Acidity decreases with depth, and the lower horizons are neutral.

Warsaw soils are adjacent to Fox, Wea, and Tippecanoe soils. Warsaw soils have a darker surface layer than Fox soils, and they are more shallow to calcareous sand and gravel than Wea and Tippecanoe soils. They also are better drained than Tippecanoe soils.

Warsaw silt loam, 0 to 2 percent slopes (WaA).—This soil is in large, irregularly shaped areas on the terraces along the major streams and their larger tributaries. It is more droughty, especially where depth to sand and gravel is near the minimum, than the deeper nearby Wea and Tippecanoe soils on terraces. Tilth in the surface layer is generally good. Surface runoff is slow, and erosion is not a problem. This soil has the profile described as representative for the series.

Included in mapping are areas of Wea soils and areas of soils that have a dark surface layer 20 to 25 inches thick.

Drought is a hazard for crops during midsummer. There are few or no limitations to the use of this soil for many nonfarm uses. (Capability unit IIs–1)

Warsaw silt loam, 2 to 6 percent slopes (WaB).—This soil is in narrow strips on the undulating terraces along major streams and their larger tributaries. It has dark-colored upper layers that are slightly thinner than those of Warsaw silt loam, 0 to 2 percent slopes. Surface tilth is generally good.

Included in mapping are areas of Wea silt loam and areas of soils that have a dark surface layer 20 to 25 inches thick.

A moderate hazard of erosion is the major limitation of this soil for farming. Droughtiness is the secondary limitation of this soil for farming. Slope is a limitation for some nonfarm uses. (Capability unit IIe–2)

Wea Series

The Wea series consists of dark-colored, well-drained soils that formed in glacial outwash materials. These soils are nearly level and gently sloping and are on river and stream terraces.

A representative profile of a Wea soil has a very dark grayish-brown silt loam surface layer about 14 inches thick. The upper part of the subsoil is brown silty clay loam to a depth of 22 inches. The lower part of the subsoil is dark yellowish-brown clay loam that extends to a depth of 47 inches. Below the subsoil is calcareous sand and gravel.

Wea soils have a deep root zone. Available moisture capacity is high. Permeability is moderate above the sand and gravel substratum. Wea soils are medium acid to neutral in the upper part of the root zone.

Most areas of these soils are cultivated. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow.

Representative profile of Wea silt loam, 0 to 2 percent slopes, NW¼SE¼ sec. 5, R. 8, T. 2, 100 feet east and 30 feet south of New Carlisle Road and Taylorsville Road intersection; Wayne Township:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

A1—8 to 14 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine. subangular blocky structure parting to moderate, fine, granular structure; neutral; clear, smooth boundary.

B1—14 to 22 inches, brown (10YR 4/3) silty clay loam; moderate, fine, subangular blocky structure; firm; very dark grayish-brown (10YR 3/2) organic stains on ped surfaces; neutral; clear, smooth boundary.

B21t—22 to 27 inches, dark yellowish-brown (10YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; black (10YR 2/1) oxide stains; medium, continuous, dark-brown (10YR 3/3) clay films on ped surfaces; neutral; clear, smooth boundary.

B22t—27 to 38 inches, dark yellowish-brown (10YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; thin, continuous, dark yellowish-brown (10YR 3/4) clay films on ped surfaces; neutral; clear, smooth boundary.

B3—38 to 47 inches, dark yellowish-brown (10YR 4/4) clay loam; very weak, medium, subangular blocky structure; firm; thick, vertical, dark-brown (10YR 3/3) clay flows; mildly alkaline, slightly calcareous; clear, wavy boundary.

C—47 to 52 inches, sand and gravel; single grain; loose; calcareous.

The A horizon and the B1 horizon, to a depth of 12 to 20 inches, are very dark grayish-brown (10YR 3/2) or very dark brown (10YR 2/2). The lower part of the B horizon is dark yellowish brown (10YR 4/4) or brown (10YR 4/3 and 7.5YR 4/4).

The B2 horizon is clay loam, silty clay loam, and sandy clay loam. Depth to calcareous sand and gravel is 42 to 60 inches. The B1 horizon is slightly acid to neutral.

Wea soils are adjacent to Fox, Ockley, Warsaw, and Tippecanoe soils. They have a darker surface layer than Fox and Ockley soils, and they are deeper to calcareous sand and gravel than Fox and Warsaw soils. They are better drained than moderately well drained Tippecanoe soils.

Wea silt loam, 0 to 2 percent slopes (WeA).—This soil is in large, irregularly shaped areas on terraces along the major streams and their larger tributaries. It has a silt loam surface layer that is high in organic-matter content and that is easy to till. Surface runoff is slow, and erosion

is little or no hazard. This soil has the profile described as representative for the series.

Included in mapping are areas of Warsaw soils and areas of soils that have a dark-colored surface layer 20 to 25 inches thick.

This soil has no major limitations for farming. It is well suited to row crops, including specialty crops. It has few limitations for many nonfarm uses. (Capability unit I–2)

Wea silt loam, 2 to 6 percent slopes (WeB).—This soil is in irregularly shaped areas of terraces along the major streams and their larger tributaries. The organic-matter content of this soil is high, and it is easy to till.

Included in mapping are areas of Warsaw soils and small areas of soils that have a dark-colored surface layer 20 to 25 inches thick.

A moderate hazard of erosion is the major limitation of this soil for cultivated crops. Slope is a limitation for some nonfarm uses. (Capability unit IIe–4)

Westland Series

The Westland series consists of dark-colored, very poorly drained soils that formed in glacial outwash. They overlie calcareous sand and gravel at a depth of 42 to 72 inches. These nearly level soils are on terraces along the rivers and streams.

A representative profile has a very dark gray silty clay loam plow layer about 8 inches thick. The upper part of the subsoil is like the plow layer in color and texture and extends to a depth of 16 inches. To a depth of 28 inches, the subsoil is dark-gray silty clay loam that is mottled with dark yellowish brown and yellowish brown. It is gray sandy loam between depths of 28 and 45 inches. The subsoil is underlain with calcareous gray sand.

Westland soils have a seasonal high water table for long periods in winter and in spring. Available moisture capacity is high, and permeability is moderate. These soils are easily drained, and drainage improves crop growth. Most Westland soils are ponded for short periods unless they are drained. Soil reaction is mostly neutral but is slightly acid or medium acid in places. These soils are well suited to field crops if drained.

Most areas of Westland soils are cultivated. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow.

Representative profile of Westland silty clay loam, NW¼SE¼ sec. 14, R. 7, T. 2, 600 feet east of Spaulding Road and 2000 feet north of Patterson Road; city of Kettering:

Ap—0 to 8 inches, very dark gray (10YR 3/1) silty clay loam; moderate, fine, granular structure; friable; neutral; abrupt, smooth boundary.

B21tg—8 to 16 inches, very dark gray (10YR 3/1) silty clay loam; weak, medium, prismatic structure parting to moderate, medium, subangular blocky structure; firm; thin, patchy, very dark gray (10YR 3/1) clay films on horizontal and vertical faces of peds; neutral; gradual, smooth boundary.

B22tg—16 to 28 inches, dark-gray (N 4/0) silty clay loam that has common, medium, distinct, dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/4) mottles; moderate, coarse, subangular blocky structure; firm; thin, patchy, very dark gray (10YR 3/1) clay films on vertical ped surfaces; neutral; clear, smooth boundary.

IIB3g—28 to 45 inches, gray (10YR 5/1) sandy loam that has few, fine, faint, dark grayish-brown (10YR 4/2) mottles; massive; friable; many greenish-gray (5GY 6/1) limestone remnants; mildly alkaline, slightly calcareous; clear, smooth boundary.

IICg—45 to 60 inches, gray (10YR 5/1) sand; single grain; loose; strongly calcareous.

The A horizon is black (10YR 2/1) to very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), and very dark brown (10YR 2/2). The B horizon is dark gray (N 4/0, 10YR 4/1), very dark gray (10YR 3/1), and gray (10YR 5/1). Clay content of the B2 horizon ranges from 28 to 35 percent, with a weighted average in most profiles of 32 to 34 percent. Thickness of the dark surface layer is 10 to 18 inches. Depth to underlying sand and sand and gravel is 42 to 72 inches. The A horizon is slightly acid to neutral. The B horizon is neutral to moderately alkaline.

Westland soils are adjacent to the well-drained Fox and Ockley soils and the very poorly drained Montgomery soils. They are darker colored and much more poorly drained than either Fox or Ockley soils. They have a coarser texture throughout than Montgomery soils. Westland soils have a higher content of sand and coarse fragments than the very poorly drained Brookston soils on uplands. They lack the light-colored surface layer of the Algiers soils. Westland soils differ from Sloan soils because they have a Bt horizon and Sloan soils do not.

Westland silty clay loam (Ws).—This nearly level soil occupies long, narrow, depressional areas and other nearly level, irregularly shaped areas on terraces. In places the texture of the surface layer is heavy silt loam.

Included in mapping are some areas that have a silty clay or clay subsoil, and some areas that are underlain at a depth of 70 to 80 inches by loam till.

A seasonal high water table is the major limitation of this soil for farming. Seasonal wetness is a limitation for most nonfarm uses. (Capability unit IIw–2)

Wynn Series

The Wynn series consists of well-drained soils that formed in silt-capped calcareous till that is moderately deep to limestone bedrock. Wynn soils are gently sloping and are mostly in the southeastern part of the county.

A representative profile has a dark grayish-brown silt loam plow layer about 9 inches thick. Beneath the plow layer is a thin, brown silt loam subsurface layer about 2 inches thick. The subsoil is a dark yellowish-brown silty clay loam and clay loam. Limestone bedrock is at a depth of 29 inches.

Wynn soils have a moderately deep root zone. Their available moisture capacity is medium to low and depends on the depth to rock. They have moderately slow permeability and typically are medium acid in some parts of the root zone. Reaction is less acid as depth increases.

Most areas of these soils are cultivated. These soils commonly are suited to cultivated crops, but some areas are droughty during the summer. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow.

Representative profile of Wynn silt loam, 2 to 6 percent slopes, moderately eroded, SW¼ sec. 30, R. 6, T. 2, 600 feet west of Route 48 and 1,650 feet north of Spring Valley Road; Washington Township:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, very fine, granular structure; friable; neutral; abrupt, smooth boundary.

A2—9 to 11 inches, brown (10YR 5/3) silt loam; weak, thin, platy structure; friable; slightly acid; clear, wavy boundary.

B&A—11 to 14 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, subangular blocky structure; friable; thin, patchy, brown (10YR 5/3) silt coats on ped surfaces; medium acid; clear, smooth boundary.

B21t—14 to 19 inches, dark yellowish-brown (10YR 4/4) silty clay loam; weak, medium, subangular blocky structure parting to weak, fine, angular blocky structure; firm; thin, continuous, dark grayish-brown (10YR 4/2) clay films; slightly acid; clear, smooth boundary.

IIB22t—19 to 25 inches, dark yellowish-brown (10YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; medium, continuous, dark-brown (10YR 4/3) clay films; neutral; clear, smooth boundary.

IIB23t—25 to 29 inches, dark yellowish-brown (10YR 4/4) clay loam; weak, medium, subangular blocky structure; firm; medium, patchy, dark-brown (10YR 3/3) clay films on vertical ped faces; approximately 10 percent weathered limestone fragments; neutral; abrupt, smooth boundary.

IIIR—29 to 35 inches, limestone bedrock; calcareous.

The Ap horizon is dark grayish brown (10YR 4/2) and dark brown (10YR 4/3). The B horizon is dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/4), and brown (7.5YR 4/4).

The B horizon is clay loam or silty clay loam. The thickness of the silt capping is 18 to 40 inches. The depth to calcareous material, where present, is 24 to 36 inches, and the depth to limestone bedrock is 24 to 40 inches. Reaction of the upper part of the B horizon is medium acid or slightly acid.

Where the Wynn soils are underlain by Ordovician calcareous limestone and shale bedrock, the layer just above the stone in places developed from the shale and is greenish gray (5GY 5/1) and gray (5Y 5/1) in some pedons. Till-derived layers over the Ordovician rock contain small amounts of stone fragments mixed with the glacial material in some places.

Wynn soils are adjacent to Russell and Xenia soils. They are underlain by limestone bedrock at a depth of 24 to 40 inches, whereas Russell and Xenia soils have no bedrock at these depths. Wynn soils have a thicker loess cap than Milton soils. The loess cap of Wynn soils is 18 inches thick or more, but it is 18 inches thick or less on Milton soils.

Wynn silt loam, 2 to 6 percent slopes, moderately eroded (WyB2).—This soil is in narrow strips around the crests of limestone bedrock hills. This soil has been eroded to the extent that the plow layer is a mixture of the original surface layer and the upper part of the subsoil. The organic-matter content of the plow layer is generally low, and this soil is subject to crusting. Surface runoff is medium.

Included in mapping are small areas of Milton soils and areas of Wynn soils that are only slightly eroded.

This soil has a moderate erosion hazard if it is cultivated. It is more droughty than deeper nearby soils. Limited depth to bedrock is a major limitation for some nonfarm uses. (Capability unit IIe-5)

Xenia Series

The Xenia series consists of moderately well drained soils that formed partly in loess and partly in calcareous loam glacial till. They are nearly level to gently sloping and are on uplands in the southeastern part of the county.

A representative profile of a Xenia soil has a dark grayish-brown silt loam plow layer about 7 inches thick. Below the plow layer is a thin, dark yellowish-brown silt loam subsurface layer about 4 inches thick. The upper part of the subsoil is yellowish-brown silty clay loam about 12 inches thick. The middle part of the subsoil is dark yellowish-brown and dark-brown silty clay loam about 12 inches thick. The lower part of the subsoil, at a depth of 35 to 45 inches, is mainly dark grayish-brown clay loam that formed in weathered till. Below the subsoil, at a depth of 45 to 78 inches, is calcareous loam glacial till.

Xenia soils have a seasonal high water table for short periods during the winter and spring. Available moisture capacity is high, and permeability is moderately slow. The root zone is deep, and it is strongly acid to medium acid in the upper part.

Most areas of Xenia soils are cultivated, and they are well suited to farming. The main crops are corn, wheat, oats, soybeans, and grass-legume meadow.

Representative profile of Xenia silt loam, 2 to 6 percent slopes, NW¼NW¼ sec. 14, R. 6, T. 2; 990 feet south of north line of sec. 14 and 825 feet east of Bigger Road; Washington Township (Sample MT-21 in laboratory data):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; medium acid; abrupt, smooth boundary.

A3—7 to 11 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, fine, granular structure; friable; brown (10YR 4/3) organic stains on ped surfaces; few, black (10YR 2/1) oxide concretions; strongly acid; clear, smooth boundary.

B21t—11 to 17 inches, yellowish-brown (10YR 5/4) silty clay loam that has common, fine, distinct, grayish-brown (10YR 5/2) mottles; moderate, fine, subangular blocky structure; firm; few black (10YR 2/1) oxide concretions; thin, patchy, dark yellowish-brown (10YR 4/4) clay films on ped surfaces; medium acid; clear, smooth boundary.

B22t—17 to 23 inches, yellowish-brown (10YR 5/4) silty clay loam that has common, fine, distinct, grayish-brown (10YR 5/2) mottles; moderate, medium, subangular blocky structure; firm; thin, patchy, dark-brown (7.5YR 4/4) clay films on ped surfaces; few black (10YR 2/1) oxide concretions; slightly acid; clear, smooth boundary.

B23t—23 to 29 inches, dark yellowish-brown (10YR 4/4) silty clay loam that has common, fine, faint, yellowish-brown (10YR 5/6) mottles and many, fine, distinct, grayish-brown (10YR 5/2) mottles; moderate, medium, subangular blocky structure; firm; thin, continuous, dark-brown (7.5YR 4/4) clay films on ped surfaces; many dark-brown (10YR 4/3) concretions and stains; slightly acid; clear, smooth boundary.

B24t—29 to 35 inches, dark-brown (10YR 4/3) silty clay loam that has common, fine, faint, yellowish-brown (10YR 5/6 and 10YR 5/8) mottles; weak, fine, subangular blocky structure; firm; thin; patchy, grayish-brown (10YR 5/2) clay films on ped surfaces; many medium oxide stains; neutral; abrupt, smooth boundary.

IIB25t—35 to 41 inches, dark grayish-brown (10YR 4/2) and dark-brown (10YR 4/3) clay loam that has common, fine, faint, yellowish-brown (10YR 5/6 and 10YR 5/8) mottles; weak, medium, subangular blocky structure; firm; thin, patchy, grayish-brown (10YR 5/2) clay films on peds; angular till pebbles present; neutral; clear, smooth boundary.

IIB3—41 to 45 inches, dark grayish-brown (10YR 4/2) clay loam that has many, fine, distinct, yellowish-brown (10YR 5/6) mottles; massive; firm; mildly alkaline; clear, smooth boundary.

IIC1—45 to 53 inches, yellowish-brown (10YR 5/4) loam; massive; firm; mildly alkaline, calcareous.

IIC2—53 to 78 inches, brown (10YR 5/3) loam; massive, firm; mildly alkaline; calcareous.

The A1 or Ap horizon is dark grayish-brown (10YR 4/2) and brown (10YR 4/3). The B horizon is dark yellowish-

brown (10YR 4/4), brown or dark brown (10YR 4/3), yellowish brown (10YR 5/4), and dark grayish brown (10YR 4/2).

The B horizon is silty clay loam and clay loam. Depth to mottling ranges from 16 to 24 inches. The depth of loess ranges from 18 to 40 inches, and the depth to calcareous till ranges from 34 to 60 inches. The reaction in the upper part of the B horizon or in the lower part of the A horizon is strongly acid to slightly acid.

Xenia soils are adjacent to well-drained Russell, somewhat poorly drained Fincastle, and very poorly drained Brookston soils. Xenia soils are the moderately well drained soils of this drainage sequence. They have a thicker loess or silt capping than Celina soils. The silt capping is 18 to 40 inches thick on Xenia soils and less than 18 inches thick on Celina soils. Xenia soils have a lighter-colored surface layer than moderately well drained Dana soils, which are formed from similar materials. Rock is not within 40 inches of the surface in Xenia soils, but in Wynn soils limestone or shale is within 40 inches of the surface.

Xenia silt loam, 0 to 2 percent slopes (XeA).—This soil is in large, slightly elevated areas of the till plain between drainageways. It has slow surface runoff, and it stays wet longer in spring than Xenia silt loam, 2 to 6 percent slopes.

Included in mapping are small areas of Fincastle and Brookston soils along the small drainageways. The Fincastle and Brookston soils are more gray throughout than Xenia soils because they are wetter. Also included are areas of moderately well drained Celina soils and some small areas that are underlain by calcareous silts.

This soil has no major limitations for use as cropland. Moderately slow permeability is a limitation for some nonfarm uses. (Capability unit I–1)

Xenia silt loam, 2 to 6 percent slopes (XeB).—This soil is in large, irregularly shaped areas between drainageways and on narrow ridges on the till plain. The root zone in Xenia soils is deep, and tilth of the surface layer is good. This soil has the profile described as representative for the series.

Included in mapping are areas of Celina soils and some small areas of Fincastle soils along small drainageways. The Fincastle soils are wetter and have a grayer subsoil than the Xenia soils.

Surface runoff is more rapid on this soil than on Xenia silt loam, 0 to 2 percent slopes. Therefore, if areas of this soil are cultivated, the erosion hazard is moderate. Moderately slow permeability and slope are limitations for some nonfarm uses. (Capability unit IIe–1)

Formation and Classification of the Soils

In this section the factors of soil formation are discussed with particular emphasis on the formation of the soils in Montgomery County. The current system of soil classification is explained, and the soil series are placed in higher categories of this system. The soil series in this county, including a profile representative of each series, are described in the section "Descriptions of the Soils."

Factors of Soil Formation

on materials deposited or accumulated by geologic processes. The important factors in soil formation are parent parent materials in the county. These materials are still materials, climate, topography, living organisms, and time.

Climate and living organisms, particularly vegetation, are the active forces in soil formation. Their effects on the parent material are modified by relief and by the length of time the parent material has been acted upon. The relative importance of each factor differs from place to place. In some places, one factor dominates and is responsible for most of the soil properties, but normally the interaction of all five factors determines the kind of soil that develops in any given place.

Parent materials

The soils of Montgomery County formed in several kinds of parent materials. These materials are glacial drift, weathered products of sedimentary bedrock, loess, lacustrine deposits, and alluvium from these materials. Many soils developed from combinations of these materials.

Glacial drift, a general term applied to till and to outwash sand and gravel, is the most extensive of the parent materials in the county. Several of the soils formed in till that was capped with loess up to 18 inches in thickness. Examples of soils formed in till overlain by thin loess are the Miamian, Milton, Lewisburg, Celina, and Corwin soils. The till is homogeneous and uniform in texture, and the soils that formed in this parent material have rather uniform, moderately fine to fine texture in the subsoil. Soils that formed in till overlain by more than 18 inches of loess capping include the Russell, Dana, and Xenia soils. The upper part of the subsoil of these soils has a lower sand content than do the soils that have a thinner loess capping.

Deposits of outwash sand and gravel were laid down by melt water that flowed in the glacial streams. It was covered by finer textured material, mostly loamy outwash and loess, and soils such as Fox, Ockley, Wea, and Westland formed in those materials. Fox, Ockley, and Wea soils have the brown and reddish colors of the parent outwash, but Westland soils are dominantly gray as a result of slow drainage and poor aeration. Rodman and Lorenzo soils formed in sorted coarse sand and gravel where little of the loamy outwash layer was originally present or where it has been removed by geologic erosion. These soils are consequently thin and droughty, and most of them have a gravelly solum and substratum.

Limestone and calcareous clay shale bedrock have influenced some of the soils. The Milton, Plattville, Wynn and other soils formed in parent material that includes some of the weathering products of the bedrock. The deep layers of these soils have the colors of the weathered bedrock. Olive brown and olive gray predominate in the layers that are weathered Ordovician limestone and shale, and reddish hues are prevalent where the rock was Silurian limestone. Fairmount soils formed entirely on the weathered Ordovician limestone and shale and are olive gray and olive throughout the subsoil.

Areas of lacustrine material are of minor extent in the county. The interlayered silty and clayey parent material of these areas is reflected in the fine-textured, plastic subsoil of the Montgomery soils.

Alluvial deposits left by floodwater are the youngest

accumulating wherever fresh sediment is added by stream overflow. The sediment was derived from the surface layer of the higher lying soils in the county and from exposures of glacial till. Ross and Medway soils in alluvial deposits are dark, fertile, and neutral in reaction.

Climate

The climate throughout Montgomery County is so uniform that differences in climate have not greatly contributed to differences between the soils.

The climate of Montgomery County during the formation of the soils has been favorable for physical and chemical weathering and for biological activity. Freezing and thawing have aided in the development of soil structure, and the warm summers have favored chemical weathering of primary minerals. Both the amount of rainfall and the temperature have been conducive to plant growth and subsequent accumulation of organic matter in all the soils.

Rainfall has been adequate to supply percolating water to leach carbonates to moderate depths, such as in the Miamian, Celina, and Xenia soils. Frequent rains have produced wetting and drying cycles that favored translocation of clay minerals and formation of soil structure such as that of the Miamian, Russell, and Ockley soils.

Topography

Topography can account for the development of different soils in the same kind of parent material. The effect of topography is illustrated by the Hennepin, Miamian, Celina, Crosby, and Brookston soils. All of these soils formed from glacial till that was thinly capped with loess.

The moderately well drained Celina soils and the well drained Miamian soils have a moderately thick solum. They generally have formed where the slope was not so steep as to encourage excessive erosion and not so nearly level as to prevent runoff. The well-drained Hennepin soils have a thin solum. They developed where the slope is steep enough that soil was removed by erosion almost as fast as it was formed. Miamian soils developed on steep slopes in a few places. In these places the Miamian soils have a thinner solum than normal. The somewhat poorly drained Crosby soils developed in nearly level areas where runoff is slow. Nearby, the very poorly drained, dark-colored Brookston soils developed in swales where organic residue accumulated as a result of the high water table that is present for most of the year. The gently sloping or sloping Miamian and Celina soils and the steeply sloping Hennepin soils are dominant in the morainic areas. Brookston and Crosby soils are dominant on the nearly level to gently undulating till plains.

Living organisms

The vegetation at the time of the settlement of Montgomery County was hardwood forest in which beech, maple, oak, hickory, and ash were the most abundant trees. Grassy clearings on the well-drained sites and marshy openings in the poorly drained swales were also present.

Soils that formed in the forested areas are acid and moderately fertile. They include the Miamian, Crosby, and Lewisburg soils. The well-drained grassy clearings are dark, less acid, and more fertile. Examples of soils that formed in these areas are the Corwin and Dana soils. In the marshy swales are very poorly drained, dark, fertile soils, such as Brookston, Millsdale, and Westland.

Small animals, insects, worms, and roots form channels that make the soils permeable. Animals mix the soil materials and contribute organic matter. Worm channels or casts are plentiful in the highly organic surface layer of Corwin and Dana soils. Crawfish channels are common in the more poorly drained soils such as Brookston, Westland, and Montgomery.

The activities of man also affect soil development. Man plows and plants and introduces changes in vegetation. Some areas he drains, some he irrigates, and some he removes for construction purposes. Also, the use of lime and fertilizer changes the chemistry of the soils. Each of these activities, in its own way, affects the future development of the soil.

Time

Time is needed for the other soil-forming factors to produce their effects. The age of a soil is indicated, to some extent, by the degree of development of its profile. In many places, however, factors other than time have been responsible for most of the differences in the kind and distinctness of horizons in the different soils. If the parent materials weather slowly, the profile develops slowly. If slopes are steep, so that soil is removed almost as fast as it is formed, distinct horizons are not developed. The Rodman soils, for example, do not have distinct horizons other than a surface horizon of organic-matter accumulation.

Most soils in the county have a well-developed profile. Examples are the Russell, Miamian, Ockley, Celina, and Crosby soils. On the flood plains, however, frequent deposits of fresh sediment periodically interrupt the soil-forming process. Ross and Medway are examples of soils on flood plains in which horizons other than the surface layer are not well developed.

Processes of Soil Formation

The soils that occupy most of the acreage in Montgomery County have a rather strongly developed profile. The processes of soil formation have produced very distinct changes in the parent materials. The well-developed soils are undulating to rolling, and they developed in deposits of glacial till and on terraces of glacial outwash that are along the major valleys. A small percentage of the county has soils that are only slightly modified from the parent materials; these are mainly the soils on flood plains or on steep slopes.

All the factors of soil formation act in unison to control the processes by which horizons are formed. These processes are of four kinds: (1) additions, (2) losses, (3) transfers, and (4) transformations. Some of these changes promote horizon differentiation, but others retard or obliterate differences that are already present.

In the survey area, the most evident addition to the soil is that of organic matter. Soils that have formed under deep-rooted grasses, or where a high water table has restricted decomposition of organic matter, have a deep, dark-colored surface horizon. It is high in organic matter, has good structure, and its base saturation exceeds 50 per-

cent. These properties describe the dark surface horizon of the Brookston and Wea soils.

Some organic matter accumulates as a thin surface mat in most of the soils. This dark-colored layer is generally obliterated by cultivation. Severe erosion may remove all evidence of this addition to the soil profile.

Leaching of carbonates from calcareous parent materials is one of the most significant losses that preceded many other chemical changes in the solum. Most of the glacial till in Montgomery County has a high carbonate content (25 to 45 percent).

Leaching has removed carbonates in most of the soils to a depth of 2 feet or more. Thus, the upper 2 feet of most of the soils now is acid. Other minerals in the soil are subjected to the same chemical weathering, but their resistance is higher and removal is slower. Following the removal of carbonates, alteration of minerals such as biotite and feldspars results in changes of color within the profile. Free-iron oxides are produced that are segregated by a fluctuating high water table to produce gray colors and mottling, such as that of the Brookston and Millsdale soils. If a seasonal high water table does not occur within the profile, brownish colors with stronger chroma or redder hue than those of the C horizon develop.

Seasonal wetting and drying of the soil profile is largely responsible for the transfer of clay from the A horizon to the ped surfaces in the B horizon. The fine clay becomes suspended in percolating water that moves through the surface layer and is carried by the water to the subsoil. There, the fine clays are deposited on the ped surfaces by drying or by precipitation caused by free carbonates. The transfer of fine clay accounts for the nearly continuous clay coatings on ped surfaces in the B horizon of such soils as the Corwin, Lewisburg, Dana, and Fincastle.

Transformations of mineral compounds occur in most soils. The results are most apparent if the development of horizons is not affected by rapid erosion or by accumulation of material at the surface. The primary silicate minerals are weathered chemically to produce secondary minerals, mainly those of the layer-lattice silicate clays. Most of the layer-lattice clays remain in the soil profile but are transferred from upper soil horizons to deeper horizons in the profile.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*3*) and revised later (*13*). The system currently used by the National Cooperative Soil Survey was developed in the early sixties (*11*) and was adopted in 1965 (*15*). It is under continual study.

The current system of classification has six categories. Beginning with the most inclusive, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. The criteria for classification are soil properties that are observable or measurable, but the properties are selected so that soils of similar genesis are grouped together. The placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available.

Table 9 gives the classification of each soil series of Montgomery County by family, subgroup, and order, according to the current system.

ORDER: Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic groupings of the soils. Two exceptions are Entisols and Histosols, which occur in many different climates. Five soil orders are represented in Montgomery County. They are Entisols, Inceptisols, Mollisols, Alfisols, and Histosols.

Entisols are mineral soils either without natural genetic horizons or with only the beginning of horizons. The only Entisols in this county are in the Algiers and Shoals series. They consist of recently deposited alluvium that overlies a buried profile.

Inceptisols are mineral soils in which horizons have started to develop, but which do not have an accumulation of illuvial clay in the B horizon.

Mollisols are mineral soils that have a dark-colored surface layer, 10 inches or more thick, that has a base saturation of more than 50 percent.

Alfisols are mineral soils that have a B horizon of clay accumulation and a base saturation of more than 35 percent at a depth within 50 inches from the top of the Bt horizon.

Histosols are organic soils.

SUBORDER: Each order is divided into suborders, primarily on the basis of those soil characteristics that produce classes having the greatest genetic similarity. The soil properties used to separate suborders are mainly those that indicate the presence or absence of a seasonal high water table or other differences resulting from the climate or vegetation.

GREAT GROUP: Suborders are separated into groups according to the presence or absence of genetic horizons and the arrangements of these horizons. The horizons used to make separations are those in which clay, iron, or humus have accumulated or those that have pans that interfere with the growth of roots or the movement of water. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like.

TABLE 9.—*Soil series classification according to the current system of classification*

Series	Family	Subgroup	Order
Algiers	Fine-loamy, mixed, nonacid, mesic	Aquic Udifluvents	Entisols.
Brookston [1]	Fine-loamy, mixed, noncalcareous, mesic	Typic Argiaquolls	Mollisols.
Carlisle	Euic, mesic	Typic Medisaprists	Histosols.
Celina	Fine, mixed, mesic	Aquic Hapludalfs	Alfisols.
Corwin	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Crosby	Fine, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Dana	Fine-silty, mixed, mesic	Typic Argiudolls	Mollisols.
Fairmount	Clayey, mixed, mesic, shallow	Typic Hapludolls	Mollisols.
Fincastle	Fine-silty, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Fox	Fine-loamy over sandy or sandy-skeletal, mixed, mesic.	Typic Hapludalfs	Alfisols.
Hennepin	Fine-loamy, mixed, mesic	Typic Eutrochrepts	Inceptisols.
Kendallville	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Landes	Coarse-loamy, mixed, mesic	Fluventic Hapludolls	Mollisols.
Lanier	Loamy-skeletal, mixed, mesic	Fluventic Hapludolls	Mollisols.
Lewisburg	Fine, illitic, mesic	Typic Hapludalfs	Alfisols.
Lorenzo	Fine-loamy over sandy or sandy-skeletal, mixed, mesic.	Typic Argiudolls	Mollisols.
Medway	Fine-loamy, mixed, mesic	Aquic Fluventic Hapludolls	Mollisols.
Miamian	Fine, mixed, mesic	Typic Hapludalfs	Alfisols.
Millsdale	Fine, mixed, noncalcareous, mesic	Typic Argiaquolls	Mollisols.
Milton	Fine, mixed, mesic	Typic Hapludalfs	Alfisols.
Montgomery [2]	Fine, mixed, noncalcareous, mesic	Typic Haplaquolls	Mollisols.
Ockley	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Plattville [3]	Fine-loamy, mixed, mesic	Aquic Argiudolls	Mollisols.
Pyrmont	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Randolph	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Ritchey [4]	Loamy, mixed, mesic	Lithic Hapludalfs	Alfisols.
Rodman [5]	Sandy-skeletal, mixed, mesic	Typic Hapludolls	Mollisols.
Ross [6]	Fine-loamy, mixed, mesic	Cumulic Hapludolls	Mollisols.
Russell	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Shoals	Fine-loamy, mixed, nonacid, mesic	Aeric Fluvaquents	Entisols.
Sloan	Fine-loamy, mixed, noncalcareous, mesic	Fluventic Haplaquolls	Mollisols.
Thackery [7]	Fine-loamy, mixed, mesic	Aquic Hapludalfs	Alfisols.
Tippecanoe	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Warsaw	Fine-loamy over sandy or sandy-skeletal, mixed, mesic.	Typic Argiudolls	Mollisols.
Wea	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Westland	Fine-loamy, mixed, noncalcareous, mesic	Typic Argiaquolls	Mollisols.
Wynn	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Xenia	Fine-silty, mixed, mesic	Aquic Hapludalfs	Alfisols.

[1] The Brookston soils in this county are taxadjuncts of the Brookston series and have a higher clay content in the B horizon than Brookston soils elsewhere.

[2] The Montgomery soils in this county are taxadjuncts of the Montgomery series because they have evidence of illuvial clay in the B horizon.

[3] The Plattville soils in this county are taxadjuncts of the Plattville series because they lack 2-chroma mottles in the upper 10 inches of the Bt horizon.

[4] The Ritchey soils in this county are taxadjuncts of the Ritchey series because they have finer textures than Ritchey soils elsewhere.

[5] The Rodman soils in this county are taxadjuncts of the Rodman series because they have a higher carbonate content closer to the surface than Rodman soils in other survey areas.

[6] Some of the Ross soils are taxadjuncts of the Ross series and have less than 24 inches of dark-colored surface material.

[7] The Thackery soils are taxadjuncts of the Thackery series because they lack 2-chroma mottles in the upper 10 inches of the Bt horizon.

SUBGROUP: Great groups are subdivided into subgroups, one representing the central or typic segment of a group, and others, called intergrades, that have properties of one great group and also one or more properties of another great group, suborder, or order. Subgroups also may be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. Examples are Typic Hapludalfs and Aquic Fluventic Hapludolls.

FAMILY: Families are separated within a subgroup primarily on the basis of properties important to the growth of plants or to the behavior of soils if used for engineering. Among the properties considered are texture, reaction, soil temperature, mineralogy, permeability, thickness of horizons, and consistence.

Some of the soils in this county do not fit in a series that has been recognized in the classification system, but recognition of a separate series would not serve a useful purpose. Such soils are named for the series they strongly resemble because they differ from those series in ways that are too small to be of consequence in interpreting their usefulness or behavior. Soil scientists designate such soils as taxadjuncts to the series for which they are named.

In this survey, soils named in the Brookston, Montgomery, Plattville, Ritchey, Rodman, Ross, and Thackery series are taxadjuncts to those series.

SERIES.—The series has the narrowest range of charac-

teristics of the categories in the classification system. It is defined in the section "How This Survey Was Made." A detailed description of each soil series in the county is given in the section "Descriptions of the Soils."

Laboratory Data

The physical and chemical analyses reported in table 10 were made of selected soils in Montgomery County by the Ohio Agricultural Research and Development Center, Ohio State University. These soils were sampled and analyzed to better understand the properties of the soils and to aid in their classification. With the exception of a Milton silt loam (sample MT-16), detailed descriptions of the soils sampled, including location of the profile described, are given in alphabetic order in the section "Descriptions of the Soils." Milton silt loam is described in the following technical profile.

Technical profile of a Milton silt loam (sample MT-16), SW¼NW¼ sec. 33, T. 3 N., R. 5 E.; Jefferson Township. This soil is within the range of the Milton series, but it has a thinner solum than is representative for the Milton series.

Ap—0 to 4 inches, dark-brown (10YR 3/3) silt loam; moderate, very fine and fine, granular structure; friable; pH 6.5; abrupt, smooth boundary.

A1—4 to 8 inches, dark-brown (10YR 3/3) silt loam; weak, fine and medium, granular structure; friable; dark grayish-brown (10YR 4/2) crushed; pH 6.5; clear, smooth boundary.

B1—8 to 10 inches, dark yellowish-brown (10YR 3/4) light silty clay loam; moderate, fine, subangular blocky structure; friable; occasional till pebbles; pH 6.8; clear, smooth boundary.

B21t—10 to 14 inches, brown (10YR 4/3) silty clay loam; moderate, medium, angular blocky structure; firm; occasional till pebbles; thin, continuous, dark-brown (10YR 3/3) clay films on ped faces; pH 7.0; clear, wavy boundary.

IIB22t—14 to 19 inches, olive (5Y 5/4) silty clay; weak, medium, prismatic, breaking to moderate, medium and coarse, subangular blocky structure; firm; patchy, very dark grayish-brown (2.5Y 3/2) clay films on ped faces; pH 7.5; clear, wavy boundary.

IIB3t—19 to 25 inches, olive (5Y 5/3) silty clay; massive; many very thin, olive (5Y 5/6) streaks; many, large limestone flagstones and fragments; calcareous; abrupt, smooth boundary.

R—25 inches, limestone bedrock; not sampled.

In addition to the data given in table 10, unpublished data on mechanical analyses are available for soils in the following series: Brookston, Miamian, Celina, Russell, Xenia, Fox, Fincastle, Plattville, and Ross. These data are on file in the State Office of the Soil Conservation Service, Columbus, Ohio; the Department of Natural Resources, Division of Lands and Soil, Columbus, Ohio; and the Ohio Agricultural Research and Development Center, Columbus, Ohio.

Physical and chemical data for Celina, Corwin, Crosby, Dana, Miami (Miamian in Montgomery County), Pyrmont, Russell, and Tippecanoe soils were sampled in Preble County and were reported in the published Soil Survey of Preble County.

The particle-size distribution shown in table 10 was obtained by the pipette method outlined by Steele and Bradfield (*12*), except that sodium hexametaphosphate was used for dispersion and a 10-gram soil sample was used for analysis. All pH measurements were made by using a 1:1 soil-water ratio. Organic carbon was determined by the wet oxidation procedure (*8*). Calcium carbonate equivalent was determined titrimetrically by the procedure of Hutchison and MacLennon (*9*). Exchangeable hydrogen, which includes titratable aluminum, was determined by the triethanolamine method (*8*). Exchangeable calcium and magnesium were determined by the EDTA method (*4*, *5*). Potassium was determined by flame photometry. Cation exchange capacity was obtained by summation of exchangeable cations.

General Nature of the County

This section gives general information about Montgomery County. It describes the climate, geology, and industry. It also discusses farming and land use. Statistics on farming were taken from records of the United States Bureau of the Census.

In general, Montgomery County can be characterized as a broad, nearly level to gently rolling till plain. Glaciation has altered the former rolling to moderately steep limestone topography by a grinding-down and filling-in process. Glacial action and subsequent stream development resulted in the Mad River, Stillwater River, Twin Creek, Wolf Creek, and the Miami River. The Miami River flows through the middle of the county, north to south, toward the Ohio River. Maximum relief within the county is about 420 feet. About 300 feet of this can be accounted for by the abrupt descent from the uplands onto the main river bottoms.

Most of the county is uplands, and local relief is 10 to 50 feet within 1 mile. The soils, developed over moderately slowly permeable glacial till, are in sizable areas that are naturally very poorly drained. Tile drainage must be carefully planned to gain a suitable outlet in many places.

Climate[3]

The climate of Montgomery County is continental. Such a climate is characteristic of the interior of a land mass the size of North America. It is marked by large annual and daily changes in temperature. Summers are moderately warm and humid, and there is an average of 25 days when temperatures are 90° F. or higher. Winters are cold and cloudy, and there is an average of 0 to 4 days of subzero temperatures. Average data for Dayton, as listed in table 11, are fairly representative of temperature and precipitation conditions in Montgomery County.

Since the terrain of Montgomery County is flat to gently rolling, the occurrence of selected spring and fall temperatures may vary from those dates given in table 12. Valley locations generally have freezes later in spring and earlier in fall than do rolling areas on hilltops, because cool air drains down the slopes and into the valleys on nights with clear skies and calm or light winds.

[3] MARVIN E. MILLER, climatologist for Ohio, National Weather Service, U.S. Department of Commerce.

TABLE 10.—*Laboratory analyses of representative*

[Dashed lines indicate value was not

Soil and sample number	Depth from surface	Particle-size distribution								
		Sand						Silt		
		Very coarse (2–1 mm.)	Coarse (1–0.5 mm.)	Medium (0.5–0.25 mm.)	Fine (0.25–0.10 mm.)	Very fine (0.10–0.05 mm.)	Total (2–0.05 mm.)	Fine (0.002–0.02 mm.)	Coarse (0.02–0.05 mm.)	Total (0.002–0.05 mm.)
	Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Celina silt loam. Sample MT-4.	0–6	2. 8	3. 9	4. 2	8. 4	5. 3	24. 6	47. 0	16. 2	63. 2
	6–8	2. 7	3. 1	4. 0	8. 9	5. 6	24. 3	40. 4	17. 3	57. 7
	8–10	. 8	2. 0	1. 9	3. 7	2. 4	10. 8	45. 2	17. 2	62. 4
	10–14	. 3	1. 0	1. 4	3. 1	2. 0	7. 8	36. 6	17. 7	54. 3
	14–19	. 6	1. 1	1. 4	3. 3	2. 4	8. 8	32. 2	16. 0	48. 1
	19–24	. 8	1. 7	2. 4	5. 7	3. 9	14. 5	29. 1	19. 2	48. 3
	24–30	6. 0	4. 8	4. 1	9. 1	7. 5	31. 5	22. 7	19. 4	42. 1
	30–41	6. 7	6. 6	5. 3	10. 8	8. 5	37. 9	27. 2	15. 9	43. 1
Corwin silt loam. Sample MT-6.	0–6	1. 0	2. 1	3. 1	7. 7	6. 3	20. 2	48. 8	14. 2	63. 0
	6–9	. 5	1. 9	3. 0	7. 3	5. 2	17. 9	41. 6	14. 6	56. 2
	9–13	. 5	1. 8	3. 2	7. 9	4. 9	18. 3	39. 5	13. 2	52. 7
	13–17	1. 2	1. 9	3. 2	8. 8	5. 3	20. 4	32. 4	13. 4	45. 8
	17–24	1. 0	2. 3	4. 7	12. 7	6. 9	27. 6	27. 8	15. 9	43. 7
	24–30	1. 6	3. 1	4. 6	10. 9	6. 9	27. 1	25. 6	15. 5	41. 1
	30–36	5. 6	5. 7	6. 2	13. 0	8. 8	39. 3	17. 2	12. 5	29. 7
	36–43	4. 1	5. 3	4. 7	9. 0	6. 8	29. 9	29. 0	11. 0	40. 0
	43–48	2. 5	4. 7	3. 4	7. 0	6. 2	23. 8	35. 6	10. 0	45. 6
	48–55	4. 1	5. 6	4. 4	8. 6	7. 5	30. 2	31. 3	14. 6	45. 9
Fox silt loam. Sample MT-17.	0–8	1. 9	8. 9	1. 3	10. 1	4. 2	37. 4	30. 8	18. 3	49. 1
	8–12	1. 5	7. 9	10. 3	8. 0	3. 1	30. 8	30. 3	14. 3	44. 6
	12–14	2. 3	8. 9	11. 7	8. 3	3. 0	34. 2	23. 5	11. 3	34. 8
	14–20	4. 1	16. 0	17. 4	9. 8	2. 4	49. 7	12. 0	5. 8	17. 8
	20–26	4. 7	21. 0	24. 8	13. 4	1. 9	65. 8	7. 8	4. 9	12. 7
	26–29	4. 8	15. 7	22. 6	15. 5	3. 7	62. 3	10. 3	8. 7	19. 0
	29–41	19. 8	35. 7	11. 3	7. 7	3. 2	77. 7	10. 6	6. 3	16. 9
Milton silt loam. Sample MT-16.	0–4	. 7	2. 5	3. 5	8. 2	5. 6	20. 5	37. 6	13. 5	51. 1
	4–9	. 8	2. 6	3. 4	7. 9	5. 2	19. 9	36. 0	15. 9	15. 9
	9–11	. 9	2. 4	3. 3	7. 6	5. 1	19. 3	36. 6	14. 9	51. 5
	11–14	. 9	1. 5	2. 0	5. 2	3. 8	13. 4	40. 6	10. 9	51. 5
	14–20	. 5	. 8	1. 2	3. 3	2. 6	8. 4	35. 9	8. 7	44. 6
	20–25	1. 3	2. 0	1. 1	2. 0	1. 5	7. 9	37. 6	6. 3	43. 9
Xenia silt loam. Sample MT-21.	0–7	. 6	1. 3	. 8	1. 2	1. 9	5. 8	51. 8	29. 9	81. 7
	7–11	0	. 6	. 6	1. 0	1. 8	4. 0	47. 6	25. 9	73. 5
	11–17	. 1	. 3	. 3	. 7	1. 9	3. 3	40. 7	28. 4	69. 1
	17–23	0	. 2	. 3	. 7	2. 3	3. 5	37. 4	31. 9	69. 3
	23–29	0	. 4	. 5	1. 3	3. 5	5. 7	36. 0	31. 9	67. 9
	29–35	. 6	1. 7	2. 0	4. 8	6. 6	15. 7	31. 5	26. 2	57. 7
	35–41	2. 3	6. 3	6. 3	13. 1	9. 4	37. 4	20. 8	13. 2	34. 0
	41–45	2. 2	5. 6	6. 3	12. 6	8. 0	34. 7	24. 1	10. 9	35. 0
	45–53	1. 9	5. 7	5. 5	11. 3	9. 1	33. 5	28. 1	15. 2	43. 3
	53–68	3. 2	6. 4	5. 8	11. 7	9. 2	36. 3	28. 6	15. 1	43. 7
	68–78	4. 6	7. 4	6. 1	11. 7	8. 9	38. 7	28. 1	14. 2	42. 3

soils in Montgomery County, Ohio

determined. The symbol < means less than]

Particle-size distribution—Con.			Reaction	Organic carbon	$CaCO_3$ equivalent	Exchangeable cations				Sum of exchangeable cations	Sum of bases	Base saturation
Clay												
Fine (<0.0002 mm.)	Coarse (0.0002–0.002 mm.)	Total (<0.002 mm.)				H	Ca	Mg	K			
Percent	*Percent*	*Percent*	*pH*	*Percent*	*Percent*	*Meq. per 100 gm.*	*Meq. per 100 gm.*	*Meq. per 100 gm.*	*Meq. per 100 gm.*	*Meq. per 100 gm.*	*Meq. per 100 gm.*	*Percent*
4.2	8.0	12.2	6.6	1.9	--------	4.7	8.4	3.5	0.45	17.1	12.4	72.5
4.3	13.7	18.0	6.9	.4	--------	4.4	8.4	3.5	.24	16.5	12.1	73.3
10.1	16.7	26.8	6.0	.5	--------	5.3	8.0	4.2	.27	17.8	12.5	70.2
19.6	18.3	37.9	5.1	.4	--------	11.7	12.1	7.1	.47	31.4	19.7	62.7
25.4	17.7	43.1	5.3	.4	--------	11.2	15.3	9.8	.56	36.9	25.7	69.6
21.1	16.1	37.2	6.5	.4	--------	6.4	15.9	10.1	.50	32.9	26.5	80.5
13.3	13.1	26.4	7.7	.3	24.2	--------	--------	--------	--------	--------	--------	--------
5.0	14.0	19.0	8.0	.3	42.2	--------	--------	--------	--------	--------	--------	--------
6.5	10.3	16.8	6.0	2.3	--------	9.0	11.8	2.6	.31	23.7	14.7	62.0
6.4	19.5	25.9	6.3	1.9	--------	8.1	13.3	3.8	.29	25.5	17.4	68.2
9.9	19.1	29.0	6.3	1.0	--------	6.9	12.3	4.0	.32	23.5	16.6	70.6
16.3	17.5	33.8	6.5	.5	--------	5.2	13.8	5.4	.38	24.8	19.6	79.0
13.7	15.0	28.7	6.8	.3	--------	4.3	12.9	5.7	.37	23.3	19.0	81.5
14.1	17.7	31.8	7.3	.4	0	2.4	12.5	5.8	.35	21.1	18.7	88.6
14.8	16.2	31.0	7.5	.7	.2	--------	--------	--------	--------	--------	--------	--------
9.5	20.6	30.1	7.9	.5	20.6	--------	--------	--------	--------	--------	--------	--------
8.4	22.2	30.6	8.0	.6	24.4	--------	--------	--------	--------	--------	--------	--------
6.2	17.7	23.9	8.0	.5	34.4	--------	--------	--------	--------	--------	--------	--------
3.4	10.1	13.5	5.7	1.2	--------	5.8	4.3	1.2	.38	11.7	5.9	50
11.7	12.9	24.6	5.5	.7	--------	8.2	6.3	2.3	.24	17.0	8.8	52
18.2	12.8	31.0	4.9	.7	--------	9.2	6.7	2.8	.24	18.9	9.7	51
21.2	11.3	32.5	4.7	.4	--------	11.1	7.1	3.2	.26	21.7	10.6	49
12.9	8.6	21.5	4.9	.3	--------	8.2	3.2	1.7	.14	13.2	5.0	38
10.3	8.4	18.7	7.0	1.8	--------	3.8	11.2	4.3	.15	19.4	15.6	80
1.9	3.5	5.4	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
11.1	17.3	28.4	6.3	2.6	--------	6.6	12.2	1.7	.36	20.9	14.3	68
11.6	16.6	28.2	6.2	1.9	--------	6.3	11.7	.4	.24	18.6	12.3	66
11.9	17.3	29.2	6.3	2.0	--------	6.5	13.0	1.6	.20	21.3	14.8	69
9.9	25.2	35.1	6.5	1.4	--------	5.5	13.3	1.4	.24	20.4	14.9	73
17.8	29.2	47.0	6.9	.9	--------	5.4	19.2	1.6	.31	26.5	21.1	80
17.0	31.2	48.2	7.6	--------	12.6	--------	--------	--------	--------	--------	--------	--------
2.6	9.9	12.5	5.1	1.0	--------	8.0	2.5	1.1	.17	11.8	3.8	32
8.2	14.3	22.5	5.1	.5	--------	7.9	4.6	1.6	.14	14.2	6.3	45
13.7	13.9	27.6	5.0	.3	--------	7.9	6.3	3.1	.24	17.5	9.6	55
14.7	12.5	27.2	5.2	.3	--------	7.9	8.0	4.1	.23	20.2	12.3	61
15.1	11.3	26.4	5.3	.3	--------	6.5	7.4	4.7	.28	18.9	12.4	66
15.4	11.2	26.6	5.6	.2	--------	5.9	8.1	5.5	.28	19.8	13.9	70
14.8	13.8	28.6	6.2	.2	--------	4.7	9.7	5.5	.23	20.1	15.4	77
12.4	17.9	30.3	7.0	.4	--------	2.8	10.5	6.5	.18	20.0	17.2	86
9.8	13.4	23.2	7.7	--------	21.9	--------	--------	--------	--------	--------	--------	--------
6.1	13.9	20.0	7.9	--------	31.1	--------	--------	--------	--------	--------	--------	--------
6.1	12.9	19.0	8.1	--------	33.5	--------	--------	--------	--------	--------	--------	--------

Light frost may form when the outside temperature is as high as 36°. This is often the case because most thermometers are placed 5 feet above the ground, and the colder air sinks below the thermometer to ground level.

Precipitation in Montgomery County varies widely from year to year, which is characteristic of a continental climate, but it is normally abundant and well distributed throughout the year. The least amount of precipitation is during fall. Showers and thundershowers account for most of the rainfall during the growing season. Thunderstorms occur on about 40 days each year and are most frequent from May through August. During the winter months, rain is the most frequent form of precipitation.

With the exception of small grains and hay, crops are generally planted in the period from April to early June. During a 10-year period, rainfall in excess of 1.2 inches per week can be expected about 11 times in April, 10 times in May, and 12 times in June. Rains of this magnitude delay field operations and may cause soil loss, since a vegetative cover is most nearly lacking during these months.

Evaporation is greatest during the warm months at a time when moisture is most critical for crop growth. Where evaporation greatly exceeds precipitation for prolonged periods, a drought may occur. During the period 1929 to 1968, extended periods of moderate to extreme drought in southwestern Ohio, as determined from the Palmer Drought Index, occurred during the 1930, 1934, 1936, 1944, 1951, 1953, 1954, 1964, and 1965 growing seasons. The longest continuing period of moderate to extreme drought in southwestern Ohio was 13 months (from February 1934 to February 1935).

The content of soil moisture goes through a seasonal cycle each year. It reaches its lowest point in October and is replenished during winter and early in spring, when precipitation exceeds water lost by evaporation. Since the water needs of all crops reach a maximum in July and August, and rainfall is almost always insufficient to meet those needs, there is a progressive drying of all soils.

On the average in Montgomery County, there are 82 clear days (0 to 30 percent cloudiness), 104 partly cloudy days (30 to 70 percent cloudiness), and 179 cloudy days (above 70 percent cloudiness). The prevailing wind is from the southwestern quadrant, and it averages about 8 miles per hour in summer and 12 miles per hour in winter. Damaging winds of 35 to 80 miles per hour are usually associated with migrating thunderstorms. Ten tornadoes have been reported in Montgomery County since 1900.

Geology

The parent material for the soils in Montgomery County originated from bedrock, from ice- and water-transported glacial drift, from wind-deposited loess, or from a combination of these. The thick mantle of assorted unconsolidated gravel, sand, clay, stones, and boulders that now covers the county was left by two major glacial ice sheets of the Pleistocene age. The Wisconsin age had the greatest effect on the county, and it was largely responsible for the present distribution of the mantle over the bedrock. The loess was blown in and deposited in a post-glacial era. Loess deposits more than 36 inches thick occur only in the southeastern corner of the county.

The underlying bedrock structure helps to determine the direction of stream drainage (*7*). The crest of a giant underground hump of rock layers, called the Cincinnati arch, crosses Montgomery County in a northeasterly direction. Rock layers near the top of this crest drop from the northeast at about 5 feet per mile. Out on the edge of the hump (anticline), the dip is less than 1 foot

TABLE 11.—*Temperature and precipitation*

[Data from Dayton, Montgomery County, Ohio]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Average monthly maximum	Average monthly minimum	Average monthly total	One year in 10 will have—		Average number of days with snow cover of 1 inch or more	Average snowfall
						Less than—	More than—		
	°F.	°F.	°F.	°F.	Inches	Inches	Inches		Inches
January	38	23	60	2	3. 11	0. 79	6. 08	2	6. 2
February	40	25	63	5	2. 66	1. 05	4. 62	1	4. 62
March	50	32	73	16	3. 77	1. 47	6. 57	1	2. 7
April	62	43	82	28	3. 78	1. 40	6. 69	(1)	. 2
May	74	54	89	38	3. 59	1. 30	6. 34	0	0
June	83	63	94	50	4. 04	1. 34	7. 39	0	0
July	87	67	96	55	3. 50	1. 39	6. 04	0	0
August	85	65	95	52	2. 97	1. 14	5. 18	0	0
September	78	57	92	41	2. 71	. 85	5. 04	0	0
October	67	46	82	31	2. 19	. 54	4. 32	0	. 1
November	51	36	72	19	2. 73	1. 11	4. 68	(1)	1. 5
December	40	26	61	7	2. 41	. 99	4. 11	1	4. 9
Year	63	45	97	−1	37. 46	28. 80	46. 81	6	20. 0

[1] Less than one-half day.

TABLE 12.—*Probabilities of last freezing temperatures in spring and first in fall*

[Data from Dayton, Montgomery County, Ohio]

Probability	Dates for given probability and temperature of—				
	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower	36° F. or lower
Spring:					
1 year in 10 later than	March 29	April 10	April 17	April 27	May 12
2 years in 10 later than	March 24	April 5	April 12	April 23	May 7
5 years in 10 later than	March 11	March 22	March 31	April 12	April 27
Fall:					
1 year in 10 earlier than	November 6	November 3	October 26	October 13	September 30
2 years in 10 earlier than	November 13	November 8	October 31	October 18	October 4
5 years in 10 earlier than	November 21	November 20	November 10	October 28	October 14

per mile. The youngest bedrock formations are of the Niagara Group in the Silurian System. These formations are the upper layers of bedrock on the arch and are mostly limestones and dolomites. The oldest rocks, exposed in the valleys, are those of the Maysville Group of the Ordovician system. The Ordovician bedrock is shale with thin, interbedded limestone strata. All bedrock strata exposed in the county are sedimentary rocks.

Most of the mantle in the county is in the form of stream-dissected glacial till plains. Parts of these plains are crossed by recessional moraines marked by hummocky topography or by the presence of many boulders in the glacial till. Till deposits range from less than 1 foot in thickness near bedrock exposures to 150 to 300 feet in thickness where these deposits fill preglacial valleys. Average thickness of glacial till on the till plain is about 20 feet.

Another result of glacial activity is the outwash observed in the form of stream-sorted deposits of gravel, sand, and even clay in kames and on valley-train terraces along the major streams of the county. Outwash also is variable in depth. It exists in deposits ranging from thin lenses to huge areas 180 feet thick in the Southern Hills and Oakwood Heights sections of south Dayton.

Industry

Farming, commerce, and industry have harmoniously complemented one another since the pioneer days of Montgomery County. Soils in the county are relatively productive, and as a result, nearly all of the easily drained areas have been cleared and farmed.

Dayton early became a market center for the surrounding districts, and it quickly prospered on its own resources and initiative. In 1829 the Cincinnati-Dayton canal enhanced the position of the city as a center for commerce and industry. Furniture, stoves, and guns were manufactured and sold. Later, the manufacture of machinery became important. Railroads replaced the canal, and Dayton became a more important crossroad for commerce. By 1885, the city already had a considerable amount of industry. Dayton's diversified industries now number approximately 800. Many are based on precision skills, and 42.5 percent of the industrial employees are classed as skilled laborers. Machine tools, accounting machines, aircraft instruments, refrigerators, air conditioners, standard business forms, magazine publications, miniaturized fractional horsepower motors, and rubber goods are among the major products.

Farming and Land Use

According to the 1964 United States Census of Agriculture, Montgomery County had 1,612 farms with a total area of 156,291 acres. This acreage of farmland made up only 52.5 percent of the total land area in the county, and it has been decreasing at more than 1 percent per year, principally because of urban and suburban developments and highway construction.

The 156,291 acres in farms was used as follows:

	Percent
Cropland, harvested	59
Cropland, pastured	8
Cropland, not harvested	12
Pastureland, permanent	6
Woodland, pastured	3
Woodland, not pastured	4
Buildings, roads, and other uses	8

The high percentage of land used for buildings, roads, and other purposes is partially explained by the large number of farms that are less than 50 acres in size.

About 85 percent of the farms were operated by owners and part owners. About 92 percent of the operators resided on the farm they operated. About 50 percent of the farmers had more than 100 days per year off from employment on the farm. An additional 10 percent of the farmers obtained part-time employment, mostly in winter.

In 1964 the average farm size was 97.0 acres, but most farms were in the 10- to 49-acre class. The average size of farms has been increasing at the rate of about 2 acres per year as a result of consolidation. Most of this consolidation has been by the absorption of many tracts of less than 50 acres into larger ones and the merging of a few tracts of about 200 acres to produce more farms of 500 acres and greater.

The raising of livestock is the most important farm enterprise, both in the number of farms producing and in the value of products sold. Returns from livestock products rank in this order: pork, beef, dairy, and poultry. Cash-grain farming was the next most important type of farming.

Approximate acreages of the principal crops in 1964 were as follows:

Corn, all purposes	41,947
Soybeans, all purposes	8,851
Wheat	17,451
Oats	3,795
Other small grains	210
Tobacco	1,094
Hay crops and grass silage	2,634
Red clover, seed	1,469
Timothy, seed	495
Sweet clover, seed	52
Vegetable field crops, all kinds	932
Berries, all kinds	110
Orchard and vineyard	657
Woodland	12,209
Nursery and greenhouse	554

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Glossary

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available moisture capacity (also termed available water capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is is commonly expressed as inches of water per inch of soil.

Bedrock. Consolidated rock or shale that underlies the soil and other unconsolidated matter.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) when treated with cold, dilute hydrochloric acid.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; will not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks to powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Contour tillage. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of slope.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Glacial outwash. Crossbedded gravel, sand, and silt deposited by melt water as it flowed from glacial ice.

Glacial till. Homogeneous glacial material consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gravel. Stone fragments consisting of rounded pebbles 2 millimeters to 3 inches in diameter.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active, and it is therefore marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has (1) distinctive characteristics caused by accumulation of clay, sesquioxides, humus, or some combination of these; (2) prismatic or blocky structure; (3) redder or stronger colors than the A horizon; or (4) some combination of these characteristics. The combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. This layer is presumed to be like that from which the overlying horizons were formed in most soils. If the underlying material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. Since part of the fine clay in the B horizon (or subsoil) of many soils has moved into the B horizon from the A horizon above, the B horizon is called an illuvial horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. It may be limited either by the infiltration capacity of the soil or by the rate at which water is applied to the surface soil.

Lacustrine deposit. Sediment deposited out of still or slack water and exposed by the lowering of the water level or the elevation of the land.

Leaching. The removal of soluble materials from soils or other material by percolation.

Loess. A fine-grained eolian deposit consisting dominantly of silt-sized particles.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse;* and contrast—*faint*, *distinct*, and *prominent*. The size measurements are these; *fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Outwash plain. Smooth-surfaced deposit of horizontally bedded sand and gravel.

Parent material. The horizon of weathered rock of partly weathered soil material from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality of a soil horizon that enables water or air to move downward through it. The permeability classes are: *very slow*, less than 0.063 inch per hour; *slow*, 0.063 to 0.2 inch per hour; *moderately slow*, 0.2 to 0.63 inch per hour; *moderate*, 0.63 to 2.0 inches per hour; *moderately rapid*, 2.0 to 6.3 inches per hour; *rapid*, 6.3 to 12.0 inches per hour; and *very rapid*, more than 12.0 inches per hour.

pH value. See Reaction, soil.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. In words, the degree of acidity or alkalinity are expressed thus:

Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.5
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and no more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeters) to the lower limit of very fine sand (0.05 millimeters). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stratified. Composed of, or arranged in, strata, or layers, such as stratified alluvium. The term is confined to geological material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer lying beneath the solum, or true soil; the C or R horizon.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 10 inches in thickness. The plowed layer.

Terrace, river. A nearly level or undulating plain, commonly rather long and narrow and having a steep front that faces a river bottom.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportions of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil. A presumed fertile soil or soil material, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens; generally the A horizons of a soil.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

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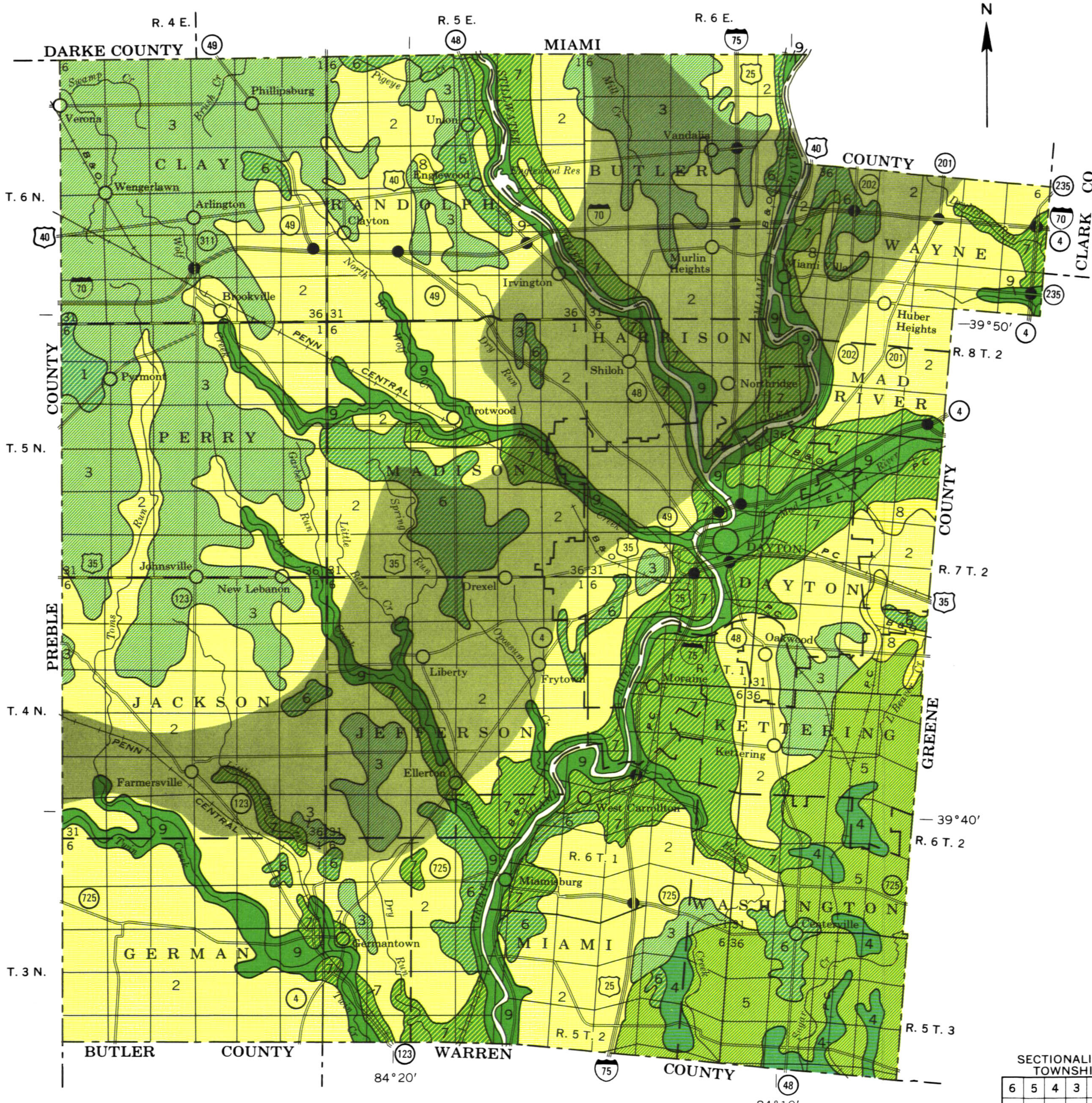
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF LANDS AND SOIL
OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER

GENERAL SOIL MAP

MONTGOMERY COUNTY, OHIO

Scale 1:190,080

1 0 1 2 3 4 Miles



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

SOIL ASSOCIATIONS

1 Lewisburg-Brookston-Pyrmont association: Deep, nearly level to moderately steep, well-drained to very poorly drained soils that have a moderately fine textured and fine textured subsoil; formed in thin loess and glacial till

2 Miamian-Celina association: Deep, mainly gently sloping to moderately steep, well drained and moderately well drained soils that have a moderately fine textured and fine textured subsoil; formed in thin loess and glacial till

3 Brookston-Crosby association: Deep, mainly nearly level to gently sloping, very poorly drained and somewhat poorly drained soils that have a moderately fine textured and fine textured subsoil; formed in thin loess and glacial till

4 Brookston-Fincastle association: Deep, mainly nearly level to gently sloping, very poorly drained and somewhat poorly drained soils that have a moderately fine textured subsoil; formed in thick loess and glacial till

5 Xenia-Russell association: Deep, mainly nearly level to gently sloping, moderately well drained and well drained soils that have a moderately fine textured subsoil; formed in thick loess and glacial till

6 Milton-Ritchey-Millsdale association: Moderately deep and shallow, nearly level to very steep, well-drained and very poorly drained soils that have a moderately fine textured and fine textured subsoil; formed in glacial till over limestone

7 Fox-Ockley association: Deep, nearly level to moderately steep, well-drained soils that have a moderately fine textured subsoil; formed in loess and loamy outwash underlain by calcareous sand and gravel

8 Westland-Montgomery association: Deep, nearly level to depressional, very poorly drained soils that have a dominantly moderately fine textured and fine textured subsoil; formed in loamy outwash and clayey lacustrine material

9 Ross-Medway association: Deep, nearly level, well drained and moderately well drained soils that have a dominantly moderately coarse textured and medium textured subsoil or underlying material; formed in loamy alluvium

Glacial boulder belt

Compiled 1972

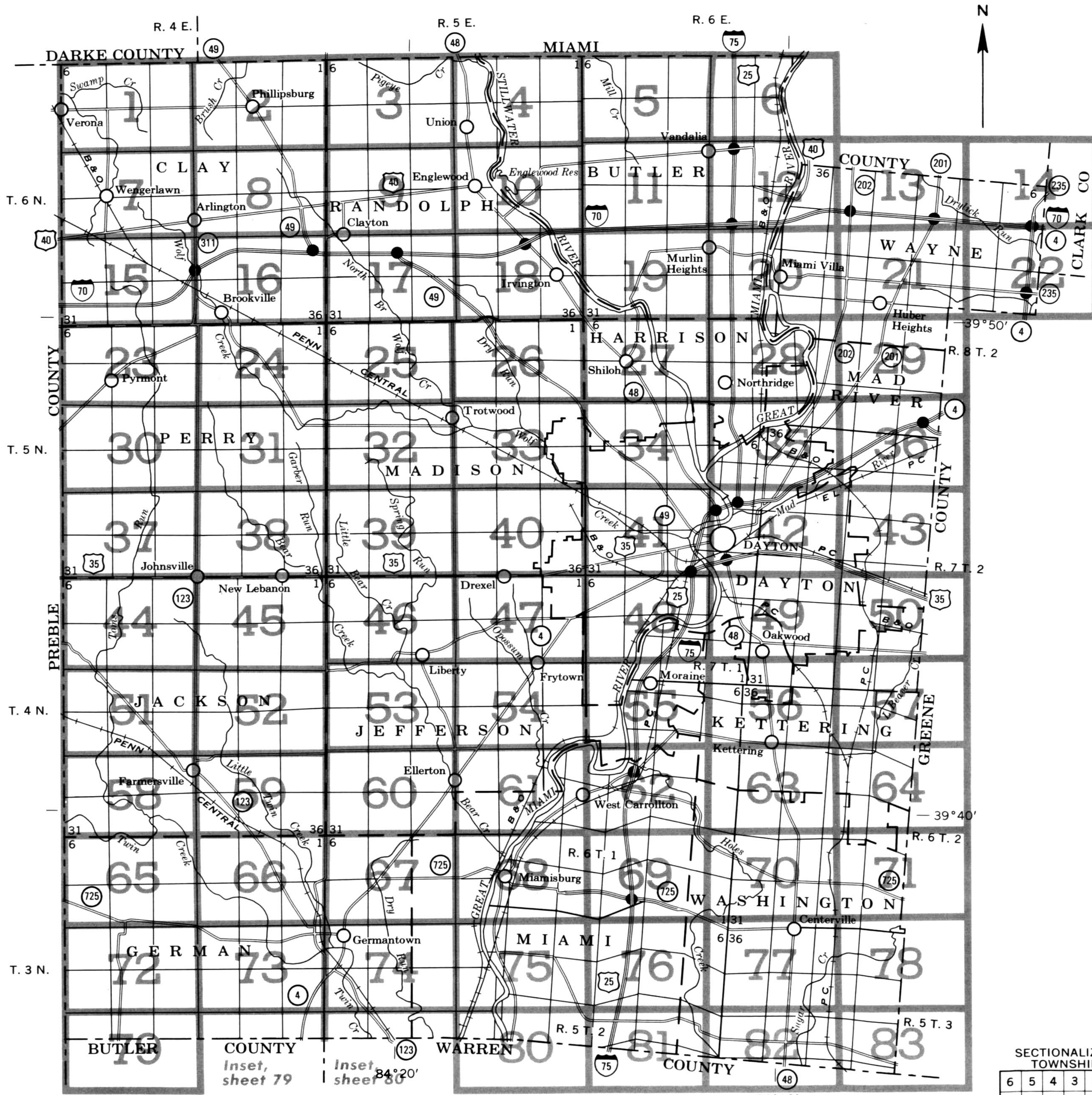
Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

INDEX TO MAP SHEETS

MONTGOMERY COUNTY, OHIO

Scale 1:190,080

1 0 1 2 3 4 Miles



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, E, or F, shows the slope. Most symbols without a slope letter are those of nearly level soils, but some are for land types that have a considerable range in slope. A final number, 2 or 3, in the symbol shows that the soil is moderately eroded or severely eroded.

SYMBOL	NAME
Ag	Algiers silt loam
Bo	Borrow pits
Bp	Brookston silt loam
Br	Brookston silt loam, overwash
Bs	Brookston silty clay loam
Bu	Brookston-Urban land complex
Ca	Carlisle muck
CeA	Celina silt loam, 0 to 2 percent slopes
CeB	Celina silt loam, 2 to 6 percent slopes
CeB2	Celina silt loam, 2 to 6 percent slopes, moderately eroded
ClB	Celina bouldery silt loam, 2 to 6 percent slopes
CoA	Corwin silt loam, 0 to 2 percent slopes
CoB	Corwin silt loam, 2 to 6 percent slopes
CsA	Crosby silt loam, 0 to 2 percent slopes
CtB	Crosby-Celina silt loams, 2 to 6 percent slopes
Cu	Crosby-Urban land complex
DaB	Dana silt loam, 2 to 6 percent slopes
FaE2	Fairmount silty clay loam, 12 to 25 percent slopes, moderately eroded
FaF2	Fairmount silty clay loam, 25 to 50 percent slopes, moderately eroded
FcA	Fincastle silt loam, 0 to 4 percent slopes
FkA	Fox sandy loam, 0 to 2 percent slopes
FkB	Fox sandy loam, 2 to 6 percent slopes
FlA	Fox loam, 0 to 2 percent slopes
FlB	Fox loam, 2 to 6 percent slopes
FlC2	Fox loam, 6 to 12 percent slopes, moderately eroded
FmA	Fox silt loam, 0 to 2 percent slopes
FmB	Fox silt loam, 2 to 6 percent slopes
FmC2	Fox silt loam, 6 to 12 percent slopes, moderately eroded
FmD2	Fox silt loam, 12 to 18 percent slopes, moderately eroded
FsC3	Fox soils, 6 to 12 percent slopes, severely eroded
FuB	Fox-Urban land complex, gently sloping
FuC	Fox-Urban land complex, rolling
FuF	Fox-Urban land complex, steep
Gp	Gravel pits
HeE2	Hennepin and Miamian silt loams, 18 to 25 percent slopes, moderately eroded
HeF2	Hennepin and Miamian silt loams, 25 to 50 percent slopes, moderately eroded
HmF3	Hennepin and Miamian soils, 18 to 50 percent slopes, severely eroded
KeA	Kendallville silt loam, 0 to 2 percent slopes
KeB	Kendallville silt loam, 2 to 6 percent slopes
KeC2	Kendallville silt loam, 6 to 12 percent slopes, moderately eroded
Ld	Landes sandy loam
Lg	Lanier sandy loam
LsB	Lewisburg silt loam, 2 to 6 percent slopes
LxC2	Lorenzo-Rodman complex, 4 to 12 percent slopes, moderately eroded
LxD2	Lorenzo-Rodman complex, 12 to 18 percent slopes, moderately eroded
Mb	Made land
Md	Medway silt loam
MlA	Miamian silt loam, 0 to 2 percent slopes
MlB	Miamian silt loam, 2 to 6 percent slopes
MlB2	Miamian silt loam, 2 to 6 percent slopes, moderately eroded
MlC2	Miamian silt loam, 6 to 12 percent slopes, moderately eroded
MlD2	Miamian silt loam, 12 to 18 percent slopes, moderately eroded
MmB	Miamian bouldery silt loam, 2 to 6 percent slopes
MnB3	Miamian clay loam, 2 to 6 percent slopes, severely eroded
MnC3	Miamian clay loam, 6 to 12 percent slopes, severely eroded
MnD3	Miamian clay loam, 12 to 18 percent slopes, severely eroded
MoB	Miamian-Urban land complex, undulating
MoC	Miamian-Urban land complex, rolling
MoE	Miamian-Urban land complex, steep
MrA	Millsdale silty clay loam, 0 to 3 percent slopes
MsA	Milton silt loam, 0 to 2 percent slopes
MsB	Milton silt loam, 2 to 6 percent slopes
MsB2	Milton silt loam, 2 to 6 percent slopes, moderately eroded
MsC2	Milton silt loam, 6 to 12 percent slopes, moderately eroded
MsD2	Milton silt loam, 12 to 18 percent slopes, moderately eroded
MtD3	Milton silty clay loam, 6 to 18 percent slopes, severely eroded
MuB	Milton-Urban land complex, undulating
MuC	Milton-Urban land complex, rolling
MuD	Milton-Urban land complex, hilly
Mv	Montgomery silty clay loam
OcA	Ockley silt loam, 0 to 2 percent slopes
OcB	Ockley silt loam, 2 to 6 percent slopes
PlB	Plattville silt loam, 2 to 6 percent slopes
PlC	Plattville silt loam, 6 to 12 percent slopes
PyA	Pyrmont silt loam, 0 to 2 percent slopes
Qu	Quarries
RcA	Randolph silt loam, 0 to 2 percent slopes
ReB	Ritchey silt loam, 2 to 6 percent slopes
ReB2	Ritchey silt loam, 2 to 6 percent slopes, moderately eroded
ReC2	Ritchey silt loam, 6 to 12 percent slopes, moderately eroded
ReE2	Ritchey silt loam, 12 to 25 percent slopes, moderately eroded
ReF2	Ritchey silt loam, 25 to 50 percent slopes, moderately eroded
RfD3	Ritchey silty clay loam, 6 to 18 percent slopes, severely eroded
Rh	Riverwash
RlE2	Rodman and Fox soils, 18 to 25 percent slopes, moderately eroded
RlF2	Rodman and Fox soils, 25 to 50 percent slopes, moderately eroded
Rs	Ross silt loam
Rt	Ross-Urban land complex
RuB	Russell silt loam, 2 to 6 percent slopes
RvC2	Russell-Miamian silt loams, 6 to 12 percent slopes, moderately eroded
RvD2	Russell-Miamian silt loams, 12 to 18 percent slopes, moderately eroded
Sh	Shoals silt loam
So	Sloan silt loam
ThA	Thackery silt loam, till substratum, 0 to 2 percent slopes
TpA	Tippecanoe silt loam, 0 to 2 percent slopes
Ua	Urban land, alluvial
Ug	Urban land, gravelly material
Um	Urban land, loamy material
WaA	Warsaw silt loam, 0 to 2 percent slopes
WaB	Warsaw silt loam, 2 to 6 percent slopes
WeA	Wea silt loam, 0 to 2 percent slopes
WeB	Wea silt loam, 2 to 6 percent slopes
Ws	Westland silty clay loam
WyB2	Wynn silt loam, 2 to 6 percent slopes, moderately eroded
XeA	Xenia silt loam, 0 to 2 percent slopes
XeB	Xenia silt loam, 2 to 6 percent slopes

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Divided
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail
- Railroad
- Ferry
- Ford
- Grade
- R. R. over
- R. R. under

Buildings
- School
- Church

Mine and quarry

Gravel pit

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Forest fire or lookout station

Windmill

Located object

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport
- Land survey division corners

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements

Flood pool line

Canals and ditches

Lakes and ponds
- Perennial
- Intermittent

Spring

Marsh or swamp

Wet spot

Drainage end or alluvial fan

RELIEF

Escarpments
- Bedrock
- Other

Short steep slope

Prominent peak

Depressions (Large, Small)
- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

SOIL SURVEY DATA

- Soil boundary and symbol
- Gravel
- Stoniness: Stony; Very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully
- Cut and fill land
- Gullied area

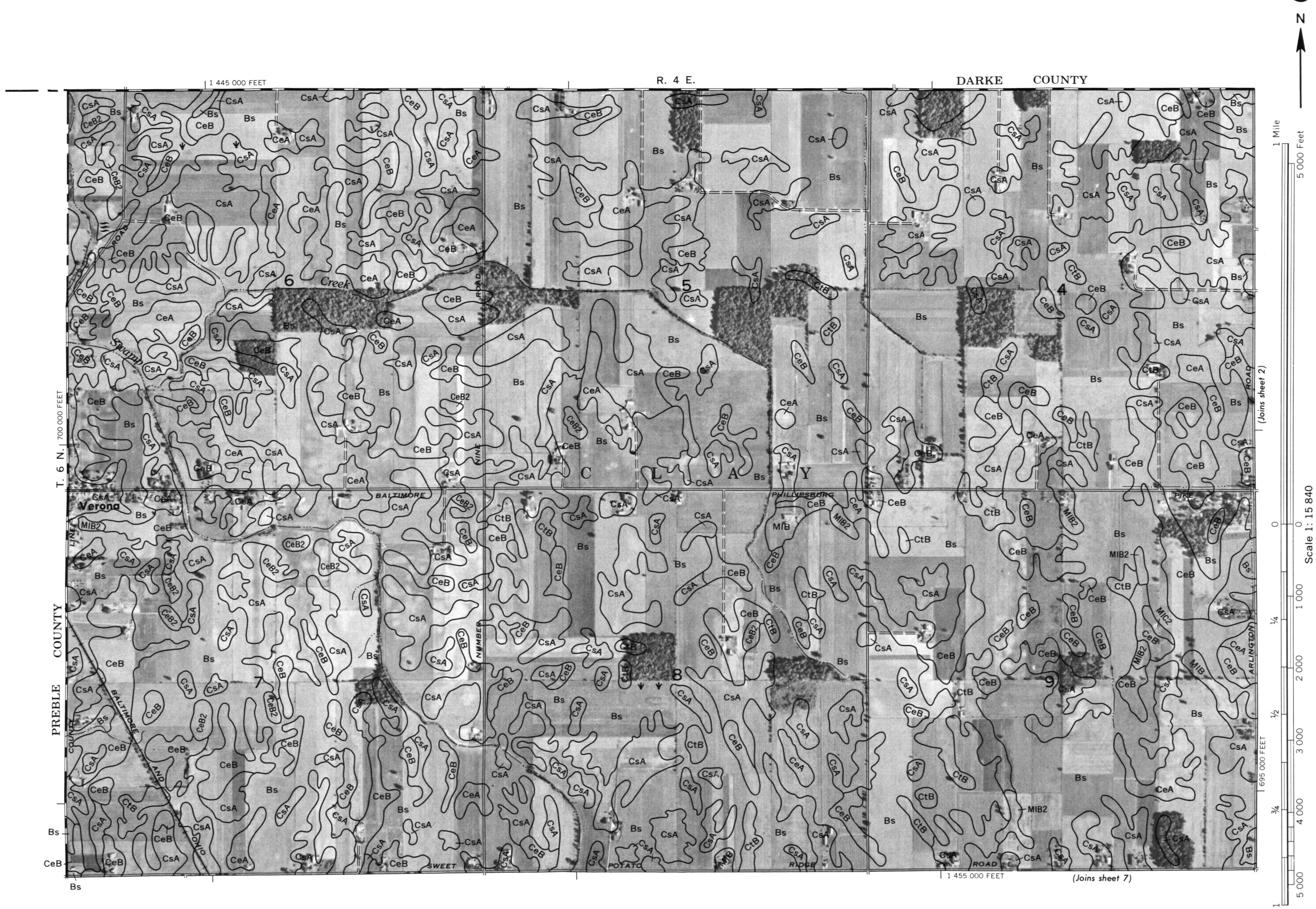
GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which it belongs. In referring to a capability unit, read the introduction to the section it is in for general information about its management. Other information is given in tables as follows:

Estimated yields, table 1, page 17.
Estimated degree of limitations of soils for wildlife habitat and kinds of wildlife, table 3, page 21.
Engineering uses of soils, tables 4, 5, and 6, pages 24, 26, and 36, respectively.
Estimated degree and kinds of limitations of soils for town and country planning, table 7, page 48.
Acreage and extent, table 8, page 59.

Map symbol	Mapping unit	Described on page	Capability unit Symbol	Capability unit Page
Ag	Algiers silt loam	61	IIw-1	13
Bo	Borrow pits	61	-----	--
Bp	Brookston silt loam	62	IIw-2	13
Br	Brookston silt loam, overwash	62	IIw-2	13
Bs	Brookston silty clay loam	62	IIw-2	13
Bu	Brookston-Urban land complex	62	-----	--
Ca	Carlisle muck	63	IIIw-4	15
CeA	Celina silt loam, 0 to 2 percent slopes	64	I-1	11
CeB	Celina silt loam, 2 to 6 percent slopes	64	IIe-3	12
CeB2	Celina silt loam, 2 to 6 percent slopes, moderately eroded	64	IIe-3	12
ClB	Celina bouldery silt loam, 2 to 6 percent slopes	64	IIe-3	12
CoA	Corwin silt loam, 0 to 2 percent slopes	65	I-2	11
CoB	Corwin silt loam, 2 to 6 percent slopes	65	IIe-4	12
CsA	Crosby silt loam, 0 to 2 percent slopes	66	IIw-3	13
CtB	Crosby-Celina silt loams, 2 to 6 percent slopes	67	IIw-3	13
Cu	Crosby-Urban land complex	67	-----	--
DaB	Dana silt loam, 2 to 6 percent slopes	68	IIe-4	12
FaE2	Fairmount silty clay loam, 12 to 25 percent slopes, moderately eroded	68	VIe-2	16
FaF2	Fairmount silty clay loam, 25 to 50 percent slopes, moderately eroded	69	VIe-2	16
FcA	Fincastle silt loam, 0 to 4 percent slopes	69	IIw-3	13
FkA	Fox sandy loam, 0 to 2 percent slopes	70	IIs-1	14
FkB	Fox sandy loam, 2 to 6 percent slopes	70	IIe-2	11
FlA	Fox loam, 0 to 2 percent slopes	70	IIs-1	14
FlB	Fox loam, 2 to 6 percent slopes	70	IIe-2	11
FlC2	Fox loam, 6 to 12 percent slopes, moderately eroded	71	IIIe-1	14
FmA	Fox silt loam, 0 to 2 percent slopes	71	IIs-1	14
FmB	Fox silt loam, 2 to 6 percent slopes	71	IIe-2	11
FmC2	Fox silt loam, 6 to 12 percent slopes, moderately eroded	71	IIIe-1	14
FmD2	Fox silt loam, 12 to 18 percent slopes, moderately eroded	71	IVe-1	15
FsC3	Fox soils, 6 to 12 percent slopes, severely eroded	71	IVe-1	15
FuB	Fox-Urban land complex, gently sloping	71	-----	--
FuC	Fox-Urban land complex, rolling	72	-----	--
FuF	Fox-Urban land complex, steep	72	-----	--
Gp	Gravel pits	72	-----	--
HeE2	Hennepin and Miamian silt loams, 18 to 25 percent slopes, moderately eroded	72	VIe-3	16
HeF2	Hennepin and Miamian silt loams, 25 to 50 percent slopes, moderately eroded	73	VIIe-1	16
HmF3	Hennepin and Miamian soils, 18 to 50 percent slopes, severely eroded	73	VIIe-1	16
KeA	Kendallville silt loam, 0 to 2 percent slopes	74	I-1	11
KeB	Kendallville silt loam, 2 to 6 percent slopes	74	IIe-3	12
KeC2	Kendallville silt loam, 6 to 12 percent slopes, moderately eroded	74	IIIe-1	14
Ld	Landes sandy loam	74	IIw-4	13
Lg	Lanier sandy loam	75	IIw-4	13
LsB	Lewisburg silt loam, 2 to 6 percent slopes	75	IIe-3	12
LxC2	Lorenzo-Rodman complex, 4 to 12 percent slopes, moderately eroded	76	IVe-2	15
LxD2	Lorenzo-Rodman complex, 12 to 18 percent slopes, moderately eroded	76	VIe-1	16
Mb	Made land	76	-----	--
Md	Medway silt loam	77	IIw-4	13
MlA	Miamian silt loam, 0 to 2 percent slopes	78	I-1	11
MlB	Miamian silt loam, 2 to 6 percent slopes	78	IIe-3	12
MlB2	Miamian silt loam, 2 to 6 percent slopes, moderately eroded	78	IIe-3	12
MlC2	Miamian silt loam, 6 to 12 percent slopes, moderately eroded	78	IIIe-1	14
MlD2	Miamian silt loam, 12 to 18 percent slopes, moderately eroded	78	IVe-1	15
MmB	Miamian bouldery silt loam, 2 to 6 percent slopes	78	IIe-3	12
MnB3	Miamian clay loam, 2 to 6 percent slopes, severely eroded	78	IIIe-1	14
MnC3	Miamian clay loam, 6 to 12 percent slopes, severely eroded	79	IVe-1	15
MnD3	Miamian clay loam, 12 to 18 percent slopes, severely eroded	79	VIe-3	16
MoB	Miamian-Urban land complex, undulating	79	-----	--
MoC	Miamian-Urban land complex, rolling	79	-----	--
MoE	Miamian-Urban land complex, steep	79	-----	--
MrA	Millsdale silty clay loam, 0 to 3 percent slopes	80	IIIw-3	15
MsA	Milton silt loam, 0 to 2 percent slopes	81	IIs-1	14
MsB	Milton silt loam, 2 to 6 percent slopes	81	IIe-5	12
MsB2	Milton silt loam, 2 to 6 percent slopes, moderately eroded	81	IIe-5	12
MsC2	Milton silt loam, 6 to 12 percent slopes, moderately eroded	81	IIIe-2	14
MsD2	Milton silt loam, 12 to 18 percent slopes, moderately eroded	81	IVe-3	16
MtD3	Milton silty clay loam, 6 to 18 percent slopes, severely eroded	81	IVe-3	16
MuB	Milton-Urban land complex, undulating	81	-----	--
MuC	Milton-Urban land complex, rolling	82	-----	--
MuD	Milton-Urban land complex, hilly	82	-----	--
Mv	Montgomery silty clay loam	82	IIIw-1	14
OcA	Ockley silt loam, 0 to 2 percent slopes	83	I-1	11
OcB	Ockley silt loam, 2 to 6 percent slopes	83	IIe-1	11
PlB	Plattville silt loam, 2 to 6 percent slopes	84	IIe-5	12
PlC	Plattville silt loam, 6 to 12 percent slopes	84	IIIe-2	14
PyA	Pyrmont silt loam, 0 to 2 percent slopes	85	IIw-3	13
Qu	Quarries	85	-----	--
RcA	Randolph silt loam, 0 to 2 percent slopes	85	IIIw-2	15
ReB	Ritchey silt loam, 2 to 6 percent slopes	86	IIIe-3	14
ReB2	Ritchey silt loam, 2 to 6 percent slopes, moderately eroded	87	IIIe-3	14
ReC2	Ritchey silt loam, 6 to 12 percent slopes, moderately eroded	87	IVe-2	15
ReE2	Ritchey silt loam, 12 to 25 percent slopes, moderately eroded	87	VIe-2	16
ReF2	Ritchey silt loam, 25 to 50 percent slopes, moderately eroded	88	VIe-2	16
RfD3	Ritchey silty clay loam, 6 to 18 percent slopes, severely eroded	88	IVe-2	15
Rh	Riverwash	88	-----	--
RlE2	Rodman and Fox soils, 18 to 25 percent slopes, moderately eroded	88	VIIe-2	16
RlF2	Rodman and Fox soils, 25 to 50 percent slopes, moderately eroded	88	VIIe-2	16
Rs	Ross silt loam	89	IIw-4	13
Rt	Ross-Urban land complex	89	-----	--
RuB	Russell silt loam, 2 to 6 percent slopes	90	IIe-1	11
RvC2	Russell-Miamian silt loams, 6 to 12 percent slopes, moderately eroded	90	IIIe-1	14
RvD2	Russell-Miamian silt loams, 12 to 18 percent slopes, moderately eroded	90	IVe-1	15
Sh	Shoals silt loam	91	IIw-1	13
So	Sloan silt loam	92	IIIw-1	14
ThA	Thackery silt loam, till substratum, 0 to 2 percent slopes	92	I-1	11
TpA	Tippecanoe silt loam, 0 to 2 percent slopes	93	I-2	11
Ua	Urban land, alluvial	93	-----	--
Ug	Urban land, gravelly material	93	-----	--
Um	Urban land, loamy material	93	-----	--
WaA	Warsaw silt loam, 0 to 2 percent slopes	94	IIs-1	14
WaB	Warsaw silt loam, 2 to 6 percent slopes	94	IIe-2	11
WeA	Wea silt loam, 0 to 2 percent slopes	94	I-2	11
WeB	Wea silt loam, 2 to 6 percent slopes	95	IIe-4	12
Ws	Westland silty clay loam	95	IIw-2	13
WyB2	Wynn silt loam, 2 to 6 percent slopes, moderately eroded	96	IIe-5	12
XeA	Xenia silt loam, 0 to 2 percent slopes	97	I-1	11
XeB	Xenia silt loam, 2 to 6 percent slopes	97	IIe-1	11

449-229 O - 70 (Face Maps)



MONTGOMERY COUNTY, OHIO NO. 1

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Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.

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MONTGOMERY COUNTY, OHIO NO. 2

MONTGOMERY COUNTY, OHIO NO. 3

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MONTGOMERY COUNTY, OHIO — SHEET NUMBER 4

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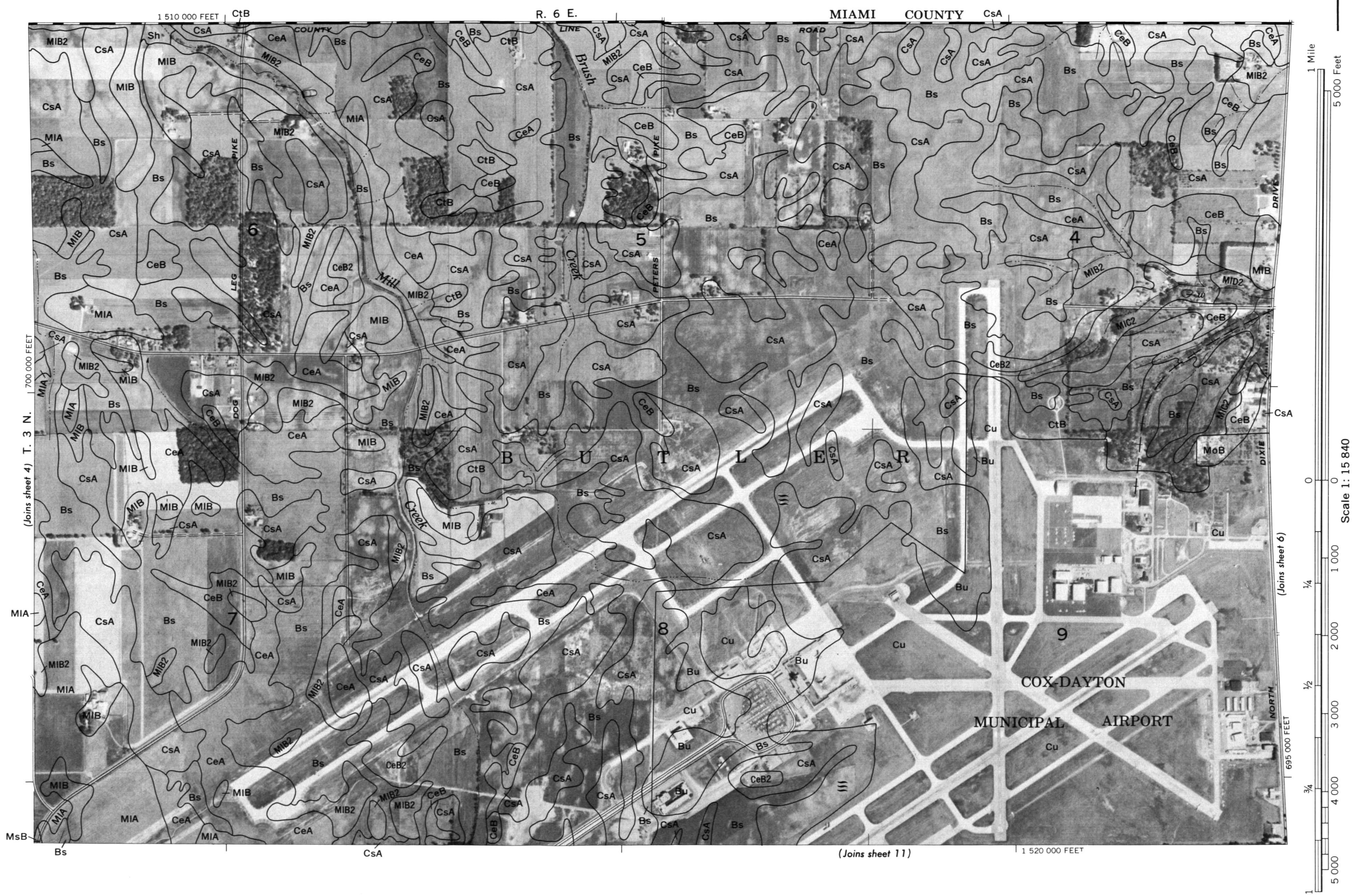
MONTGOMERY COUNTY, OHIO NO. 4

5



MONTGOMERY COUNTY, OHIO NO. 5

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

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N

Scale 1: 15 840

1 Mile — ¾ — ½ — ¼ — 0

5 000 Feet — 4 000 — 3 000 — 2 000 — 1 000 — 0 — 5 000

Land division corners are approximately positioned on this map.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
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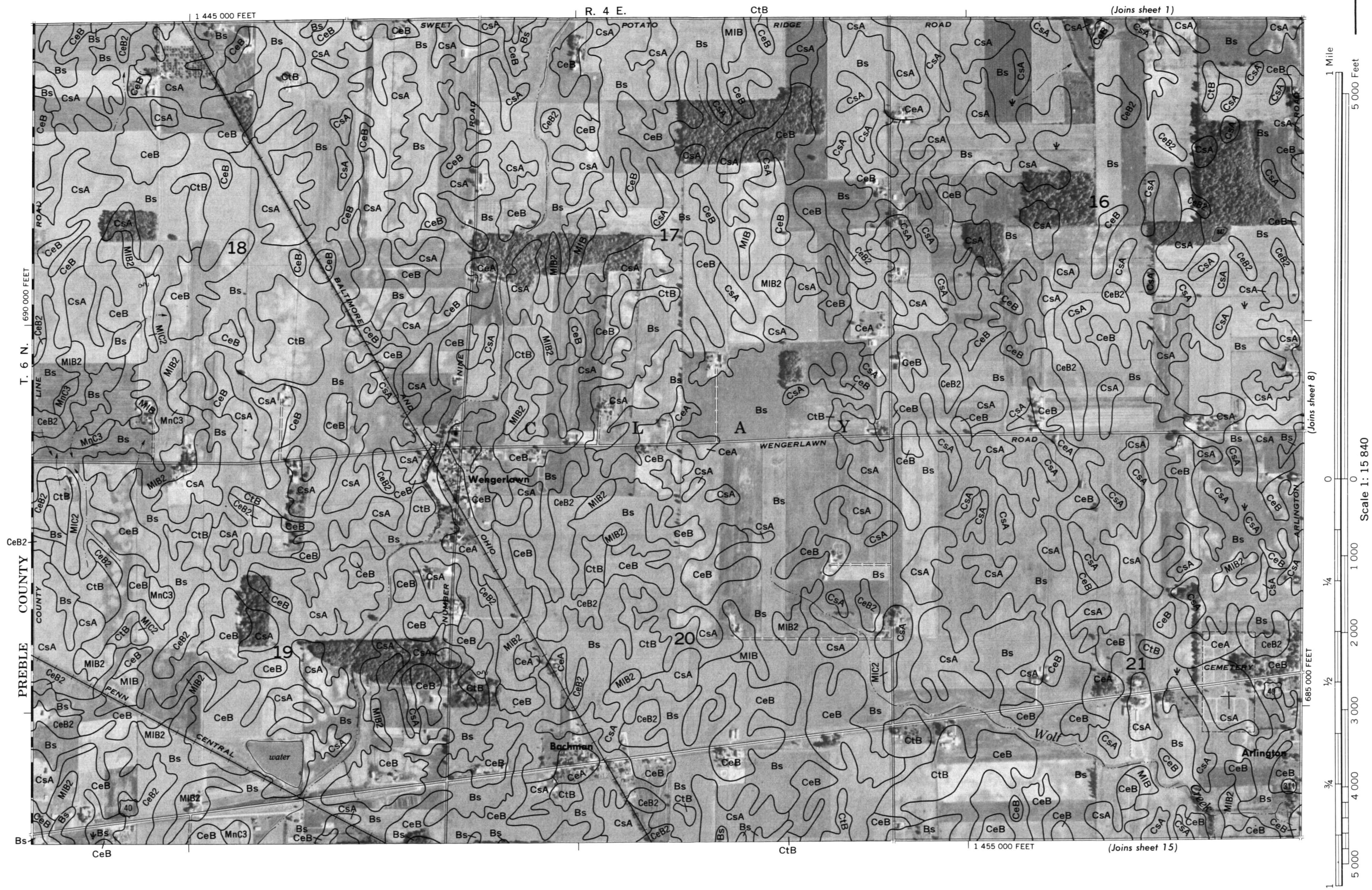


MONTGOMERY COUNTY, OHIO NO. 7

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
Land division corners are approximately positioned on this map.

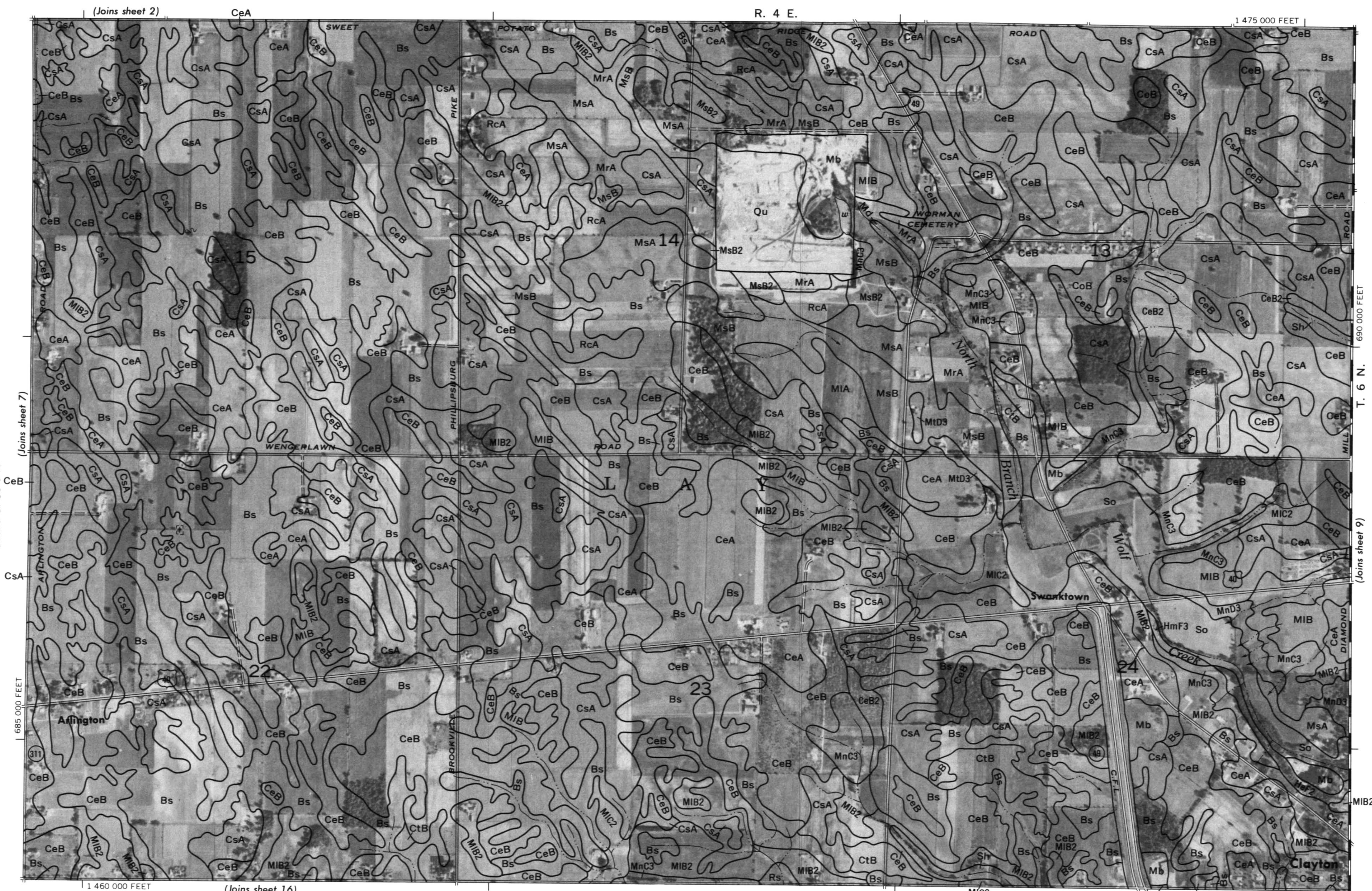
MONTGOMERY COUNTY, OHIO — SHEET NUMBER 8

N

Scale 1: 15 840

1 Mile — 0 — ¼ — ½ — ¾ — 1

5 000 Feet — 0 — 1 000 — 2 000 — 3 000 — 4 000 — 5 000



Land division corners are approximately positioned on this map.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
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MONTGOMERY COUNTY, OHIO NO. 8

MONTGOMERY COUNTY, OHIO NO. 9

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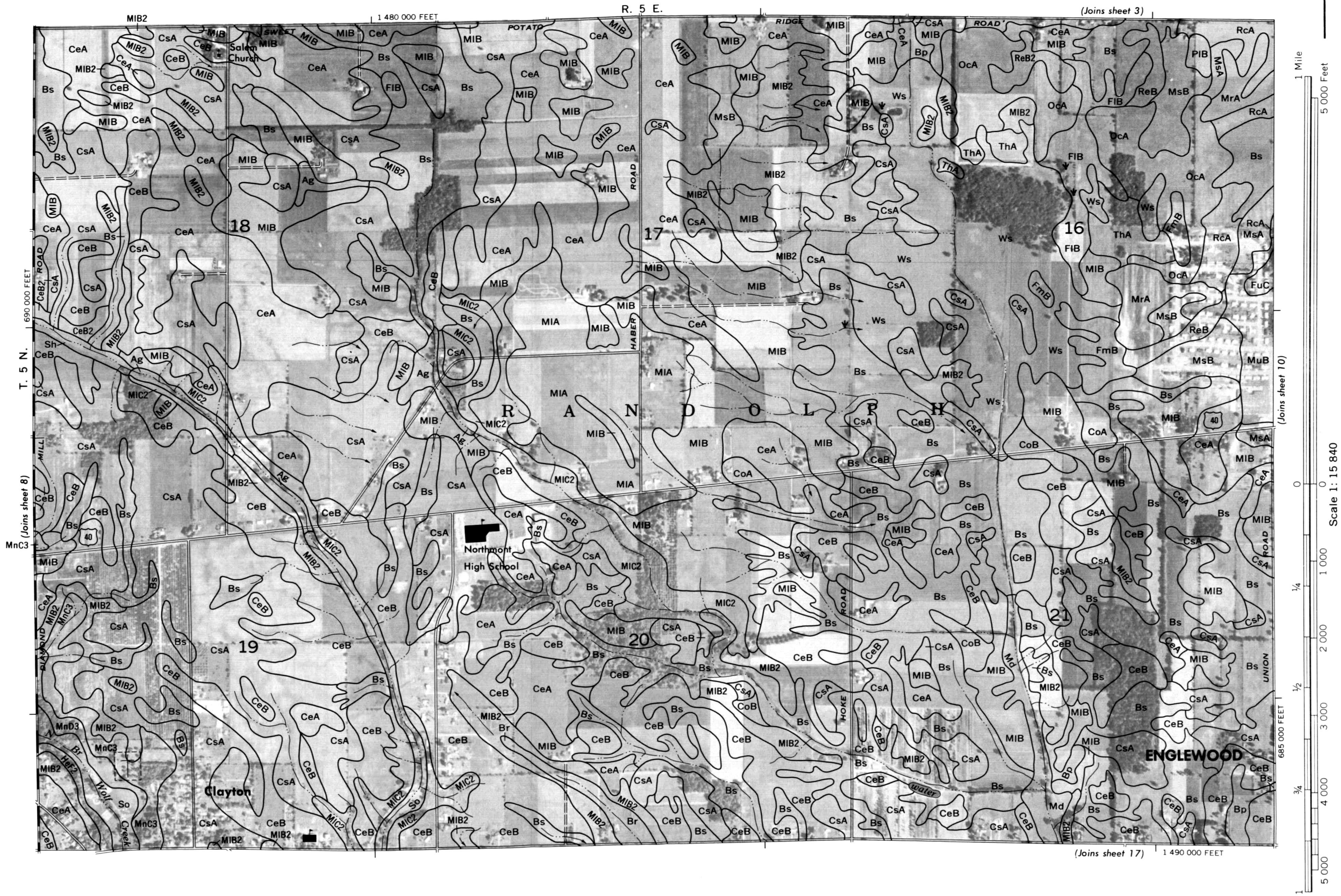

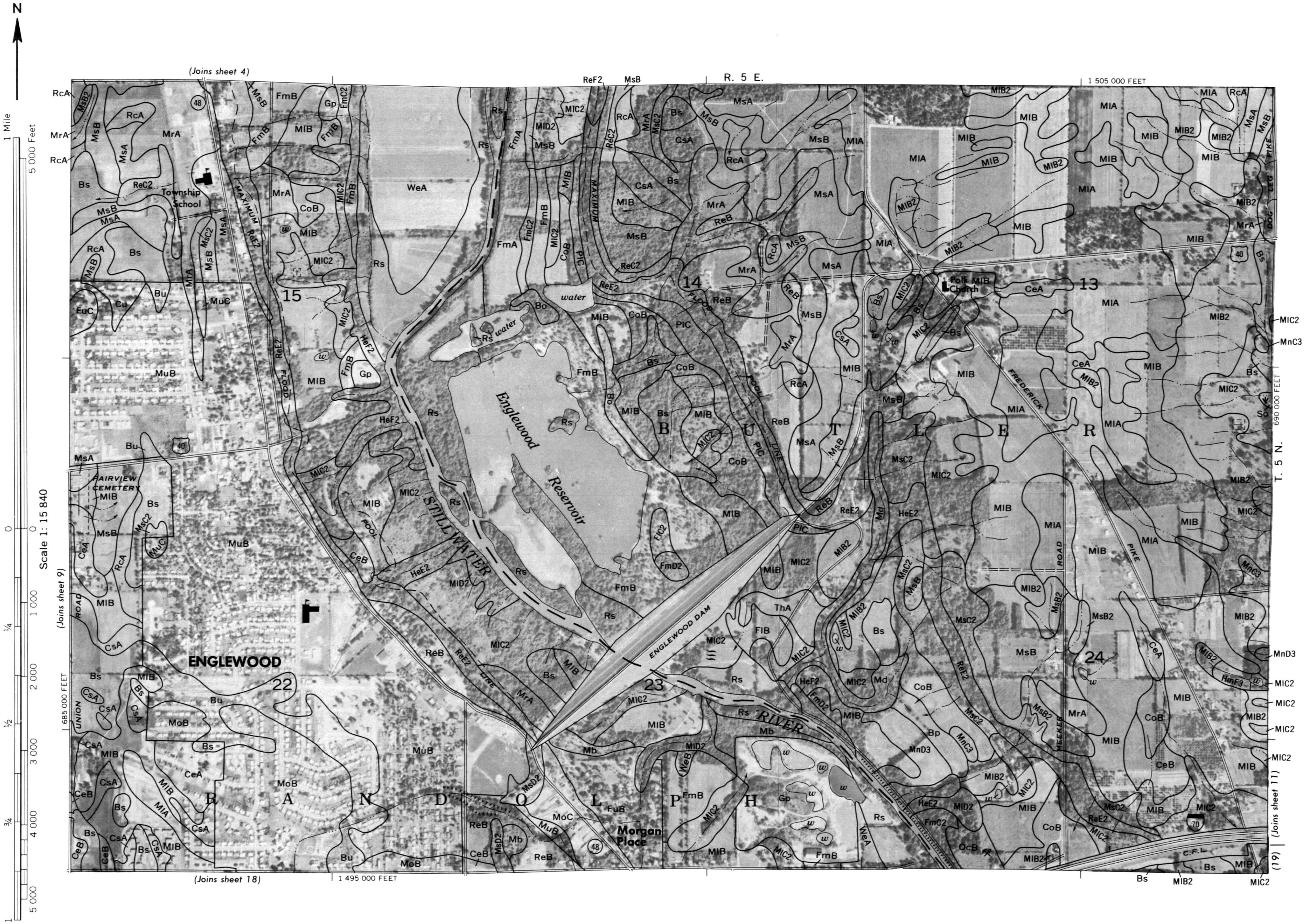

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MONTGOMERY COUNTY, OHIO NO. 11

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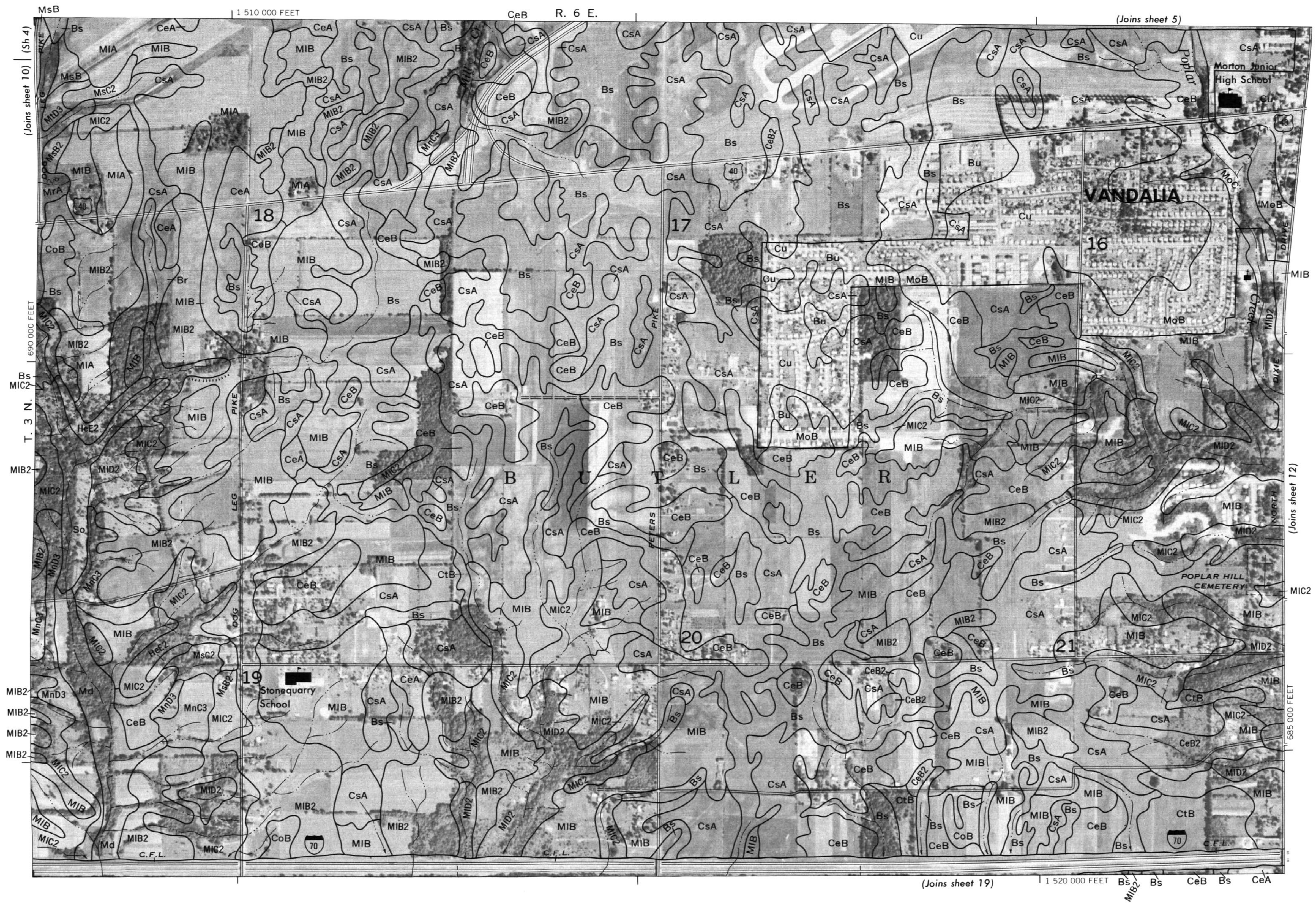
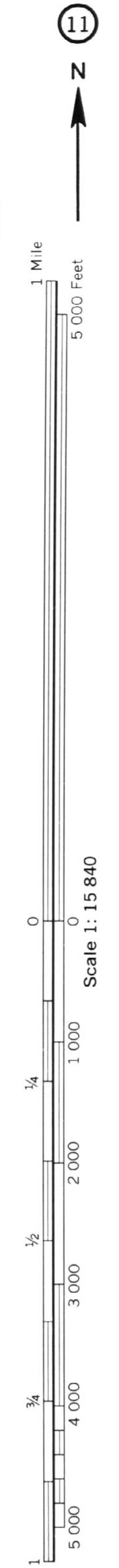
Land division corners are approximately positioned on this map.





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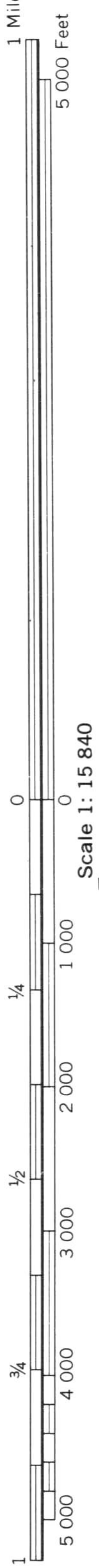

Scale 1: 15 840

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MONTGOMERY COUNTY, OHIO NO. 13

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MONTGOMERY COUNTY, OHIO NO. 15

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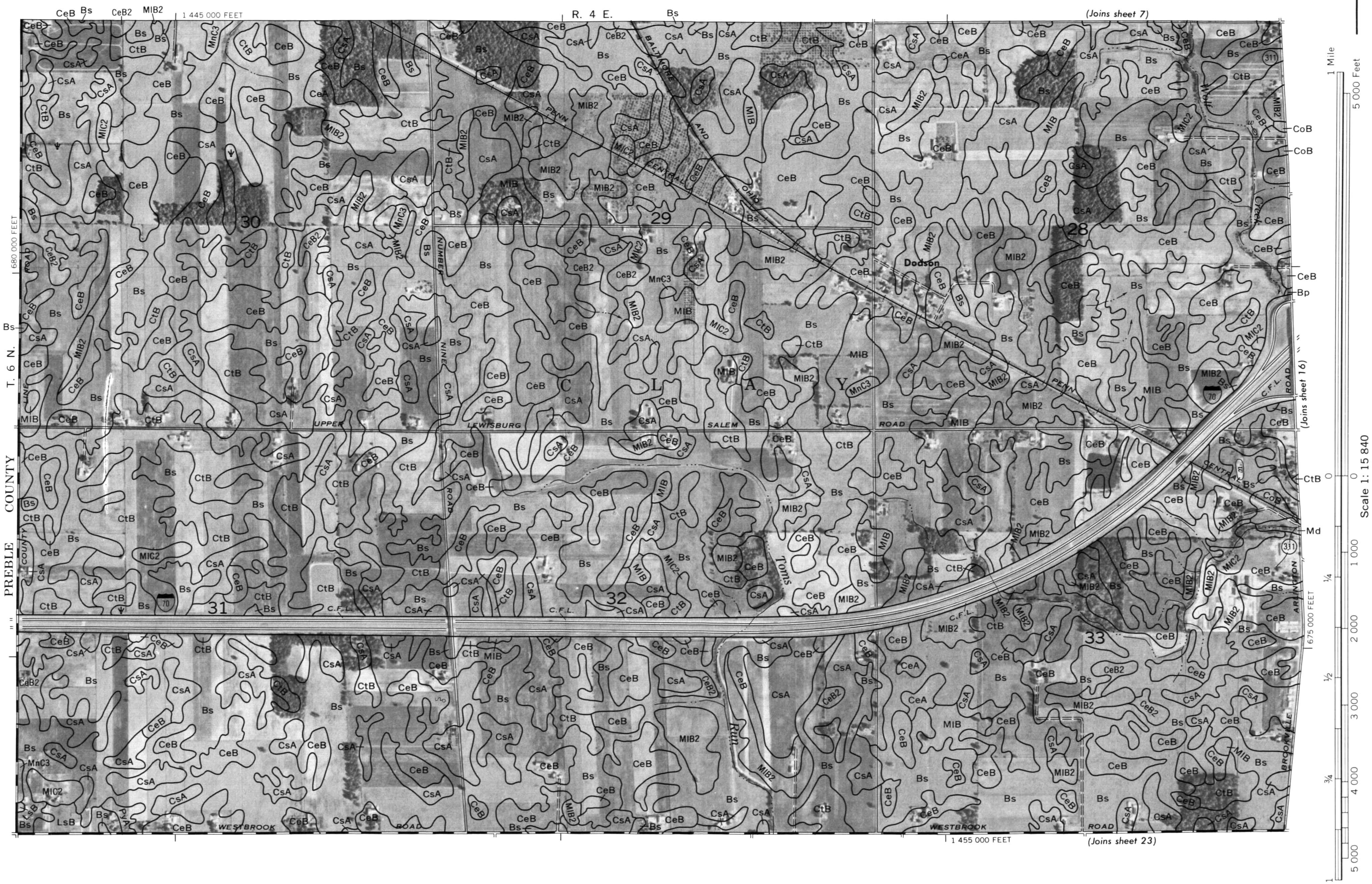
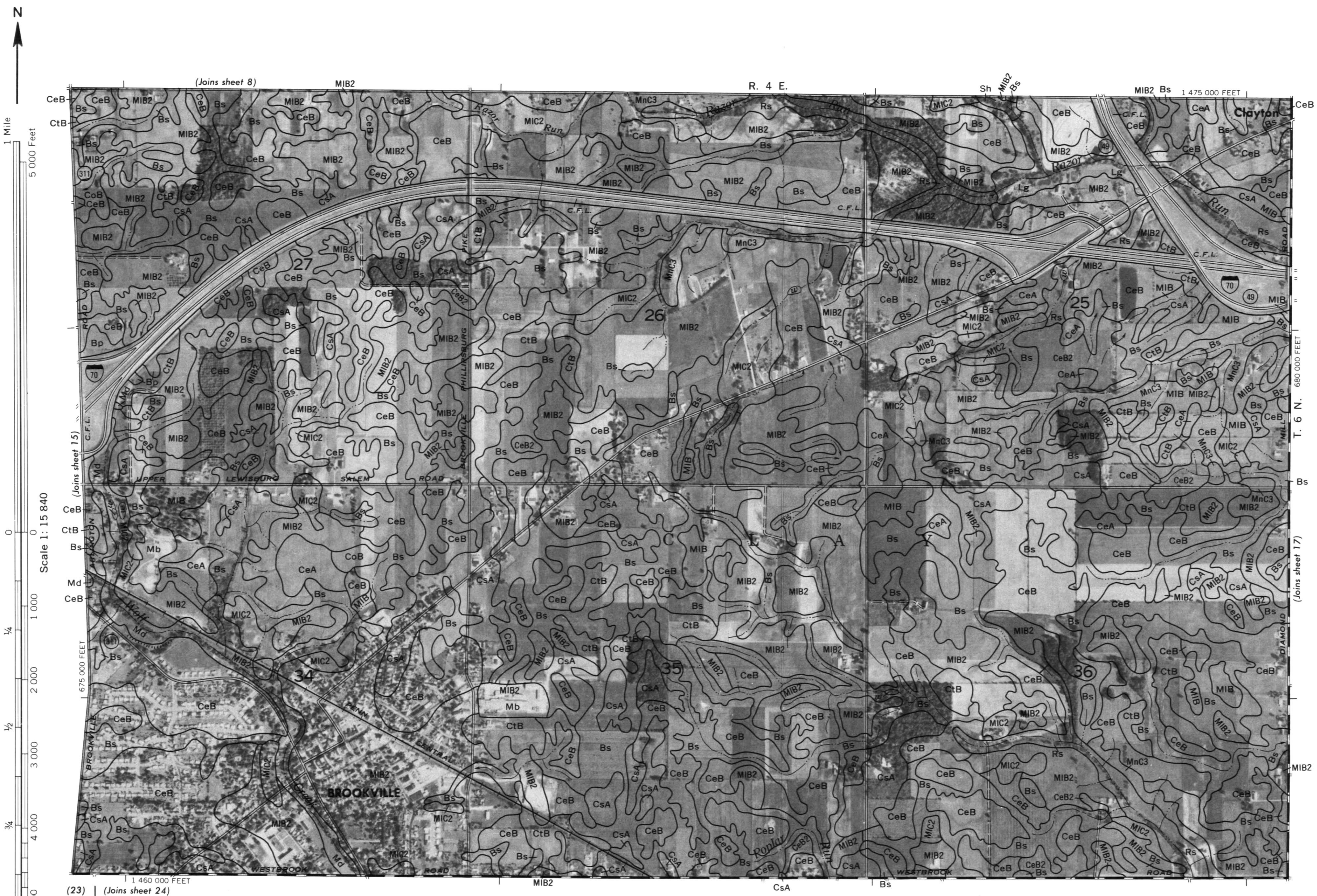


MONTGOMERY COUNTY, OHIO — SHEET NUMBER 16



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MONTGOMERY COUNTY, OHIO NO. 16

MONTGOMERY COUNTY, OHIO NO. 17

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Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.

MONTGOMERY COUNTY, OHIO — SHEET NUMBER 18

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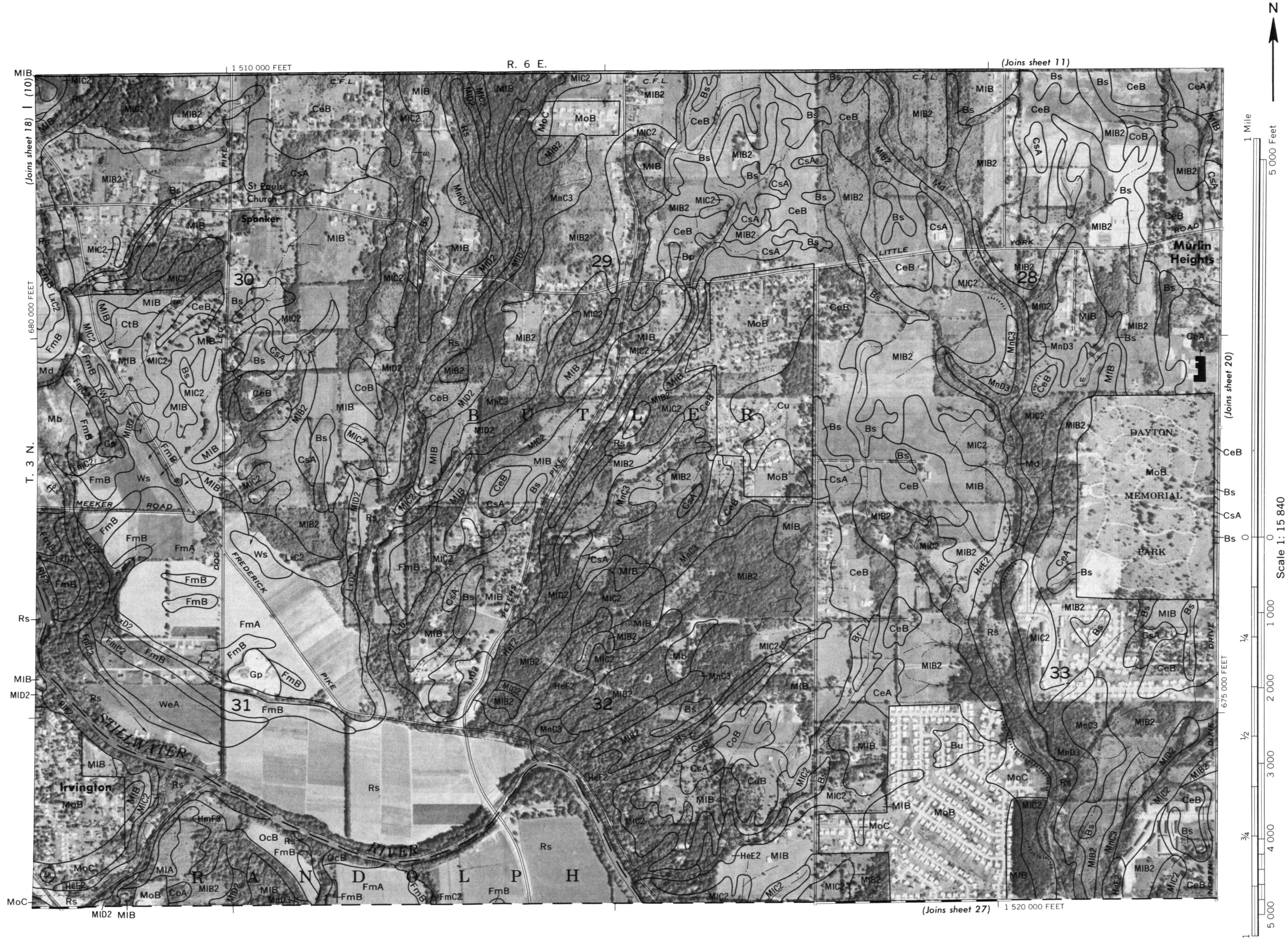

MONTGOMERY COUNTY, OHIO NO. 19

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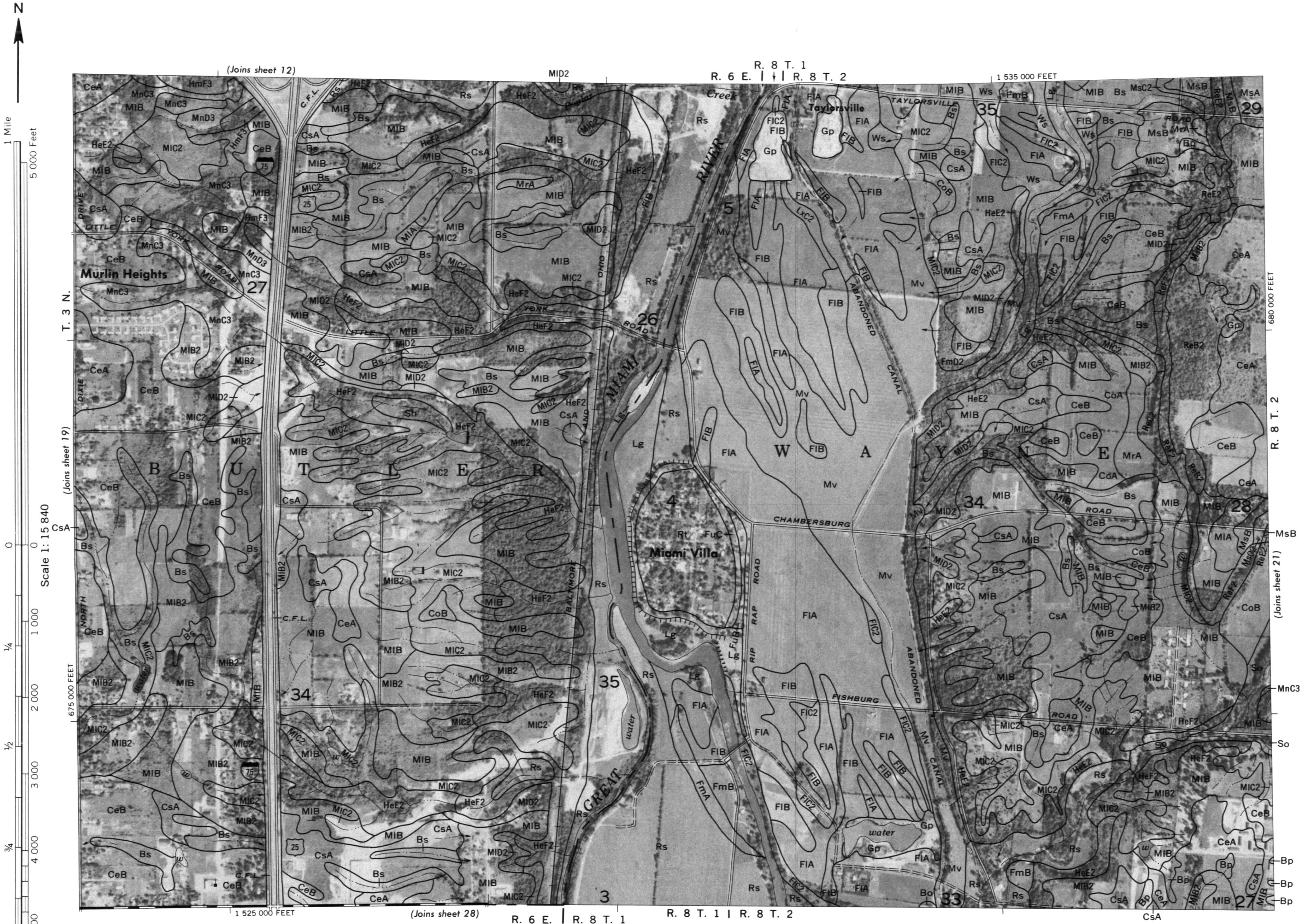
Land division corners are approximately positioned on this map.



Land division corners are approximately positioned on this map.

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MONTGOMERY COUNTY, OHIO NO. 21

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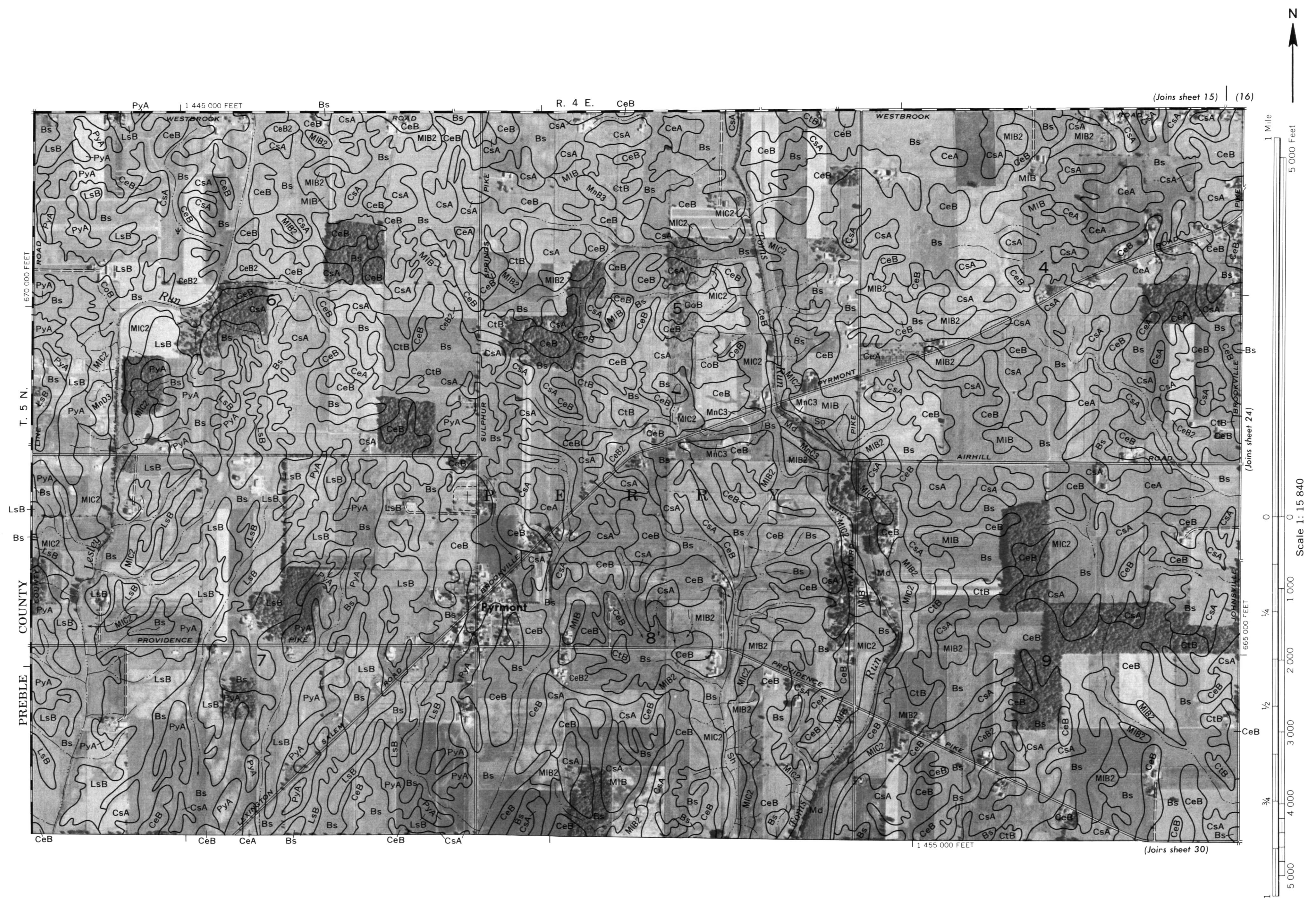
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.

N

1 Mile
5 000 Feet
Scale 1: 15 840

Land division corners are approximately positioned on this map.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.



MONTGOMERY COUNTY, OHIO NO. 23

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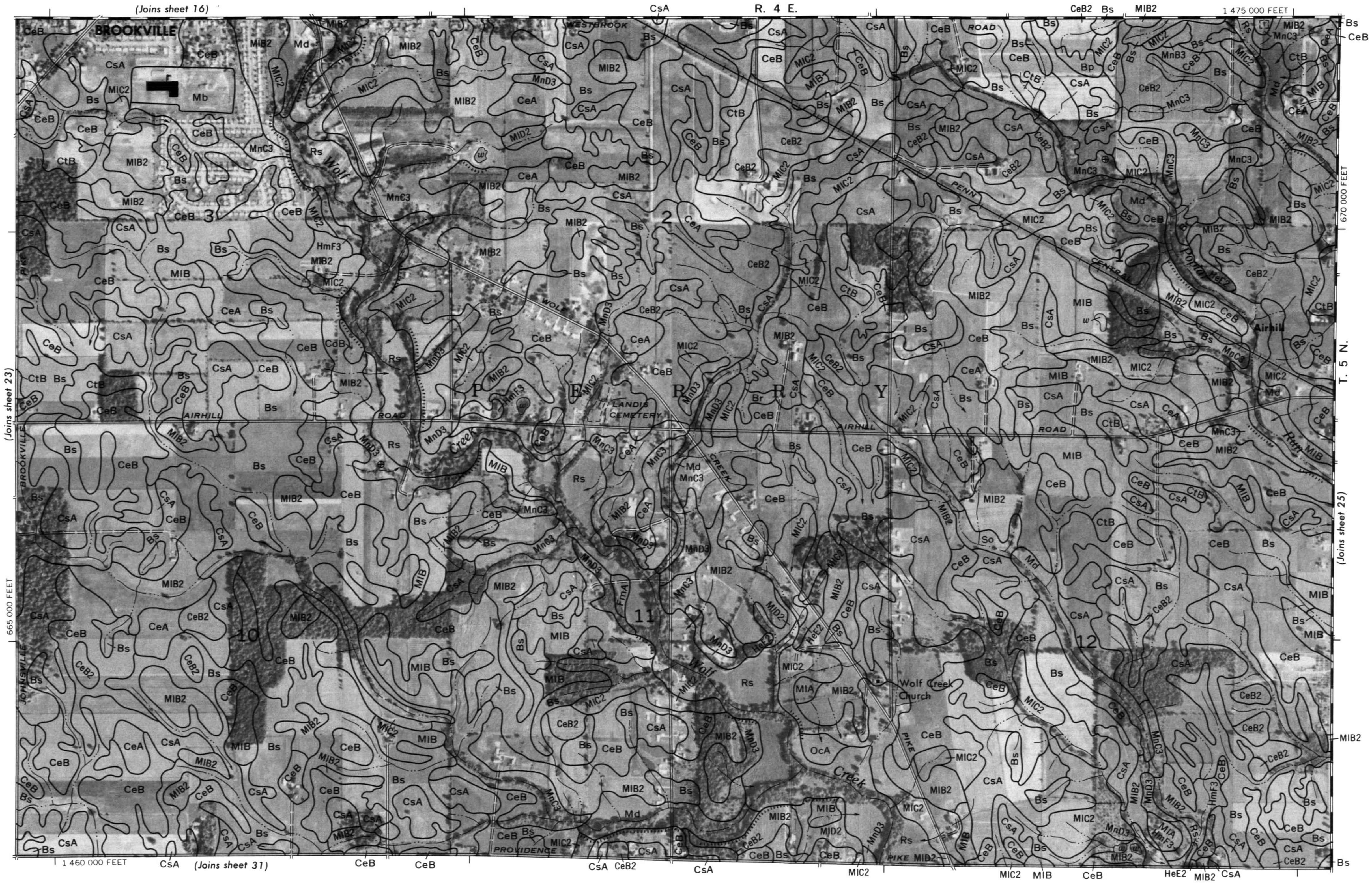
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
Land division corners are approximately positioned on this map.

MONTGOMERY COUNTY, OHIO — SHEET NUMBER 24

N

Scale 1: 15 840

1 Mile — 5 000 Feet



Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

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MONTGOMERY COUNTY, OHIO NO. 25

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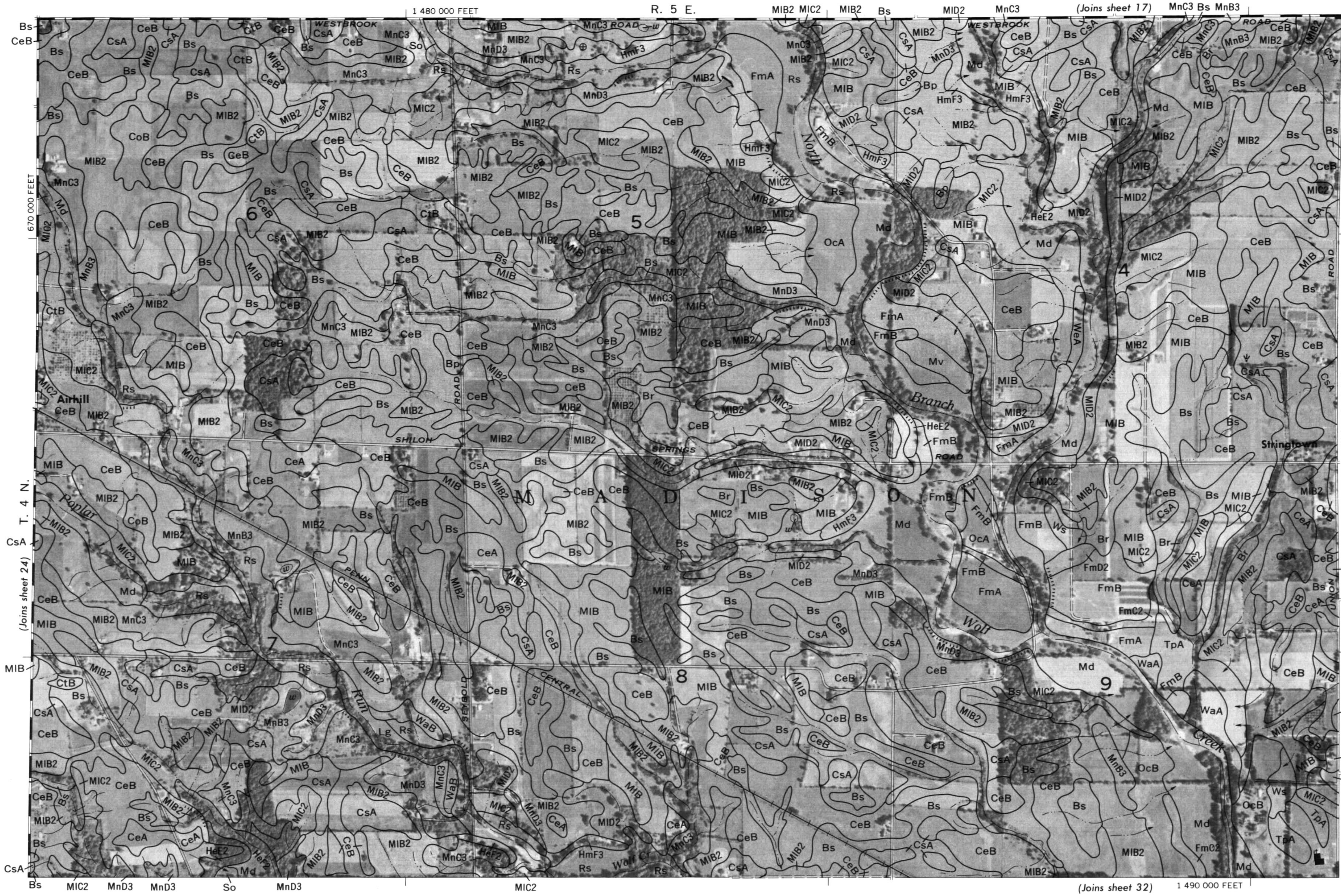
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
Land division corners are approximately positioned on this map.



N

Scale 1: 15 840

1 Mile
5 000 Feet

MONTGOMERY COUNTY, OHIO — SHEET NUMBER 26

Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 26

MONTGOMERY COUNTY, OHIO NO. 27

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Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

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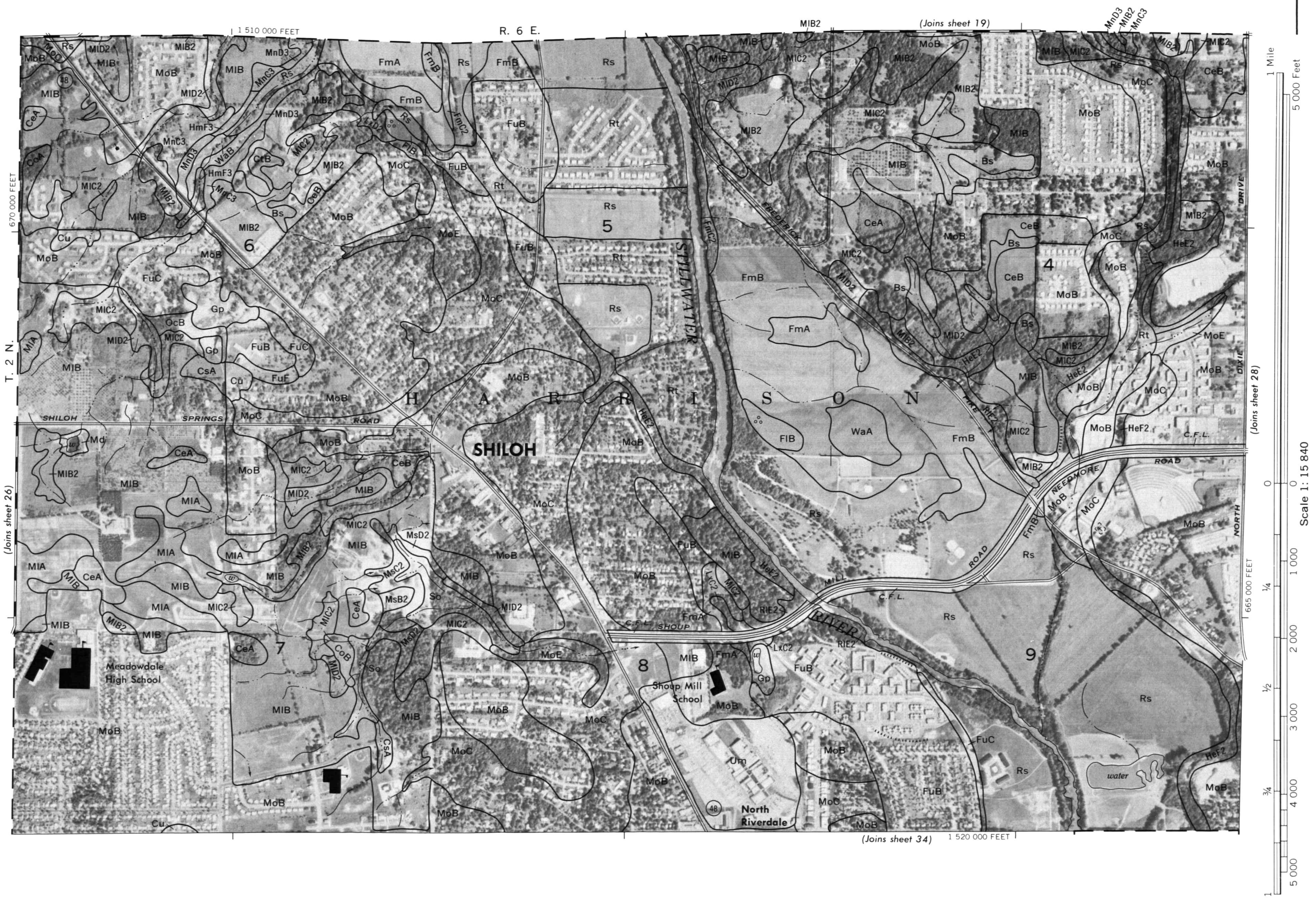


MONTGOMERY COUNTY, OHIO — SHEET NUMBER 28

Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

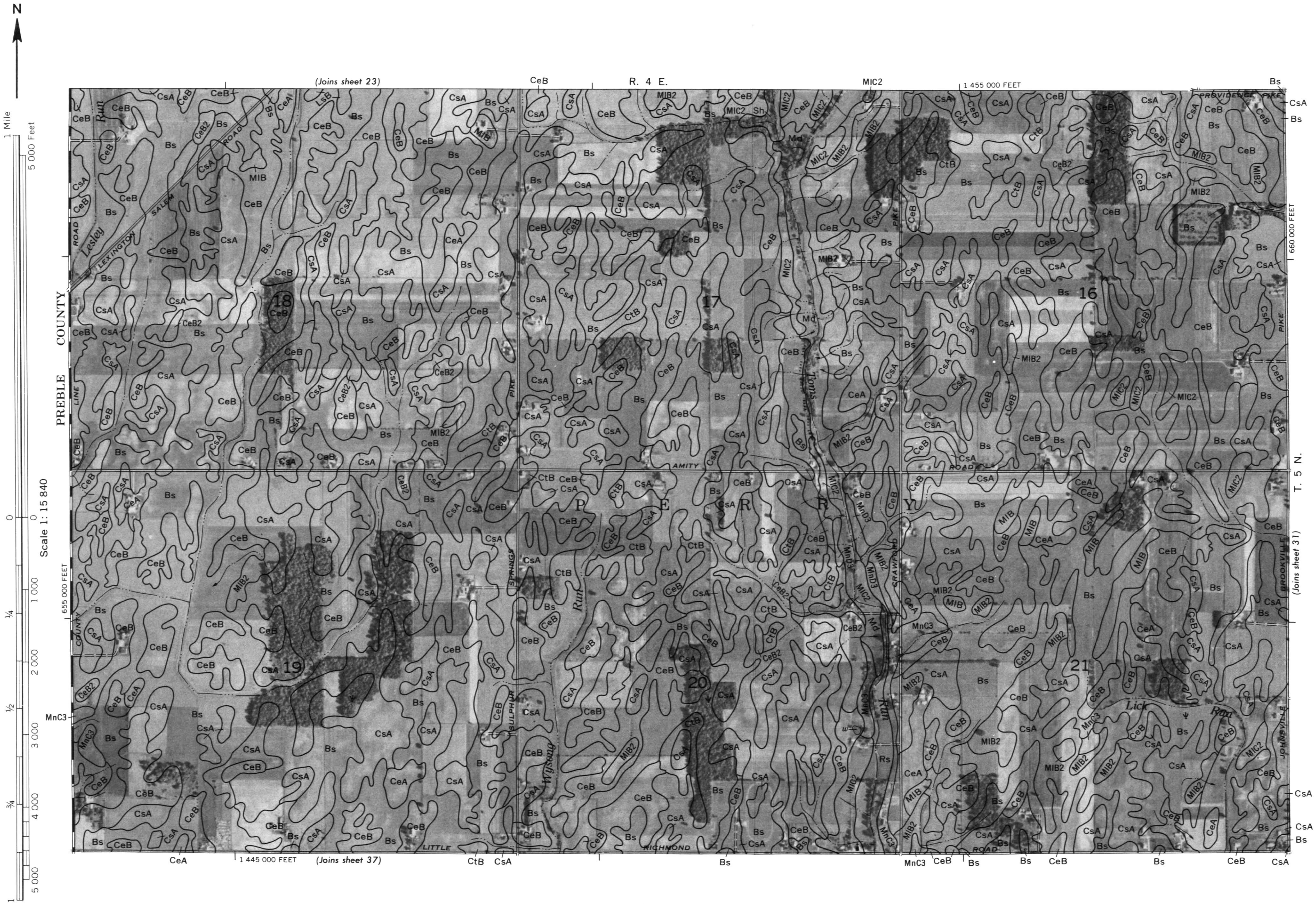
MONTGOMERY COUNTY, OHIO NO. 29

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.

MONTGOMERY COUNTY, OHIO — SHEET NUMBER 30



Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

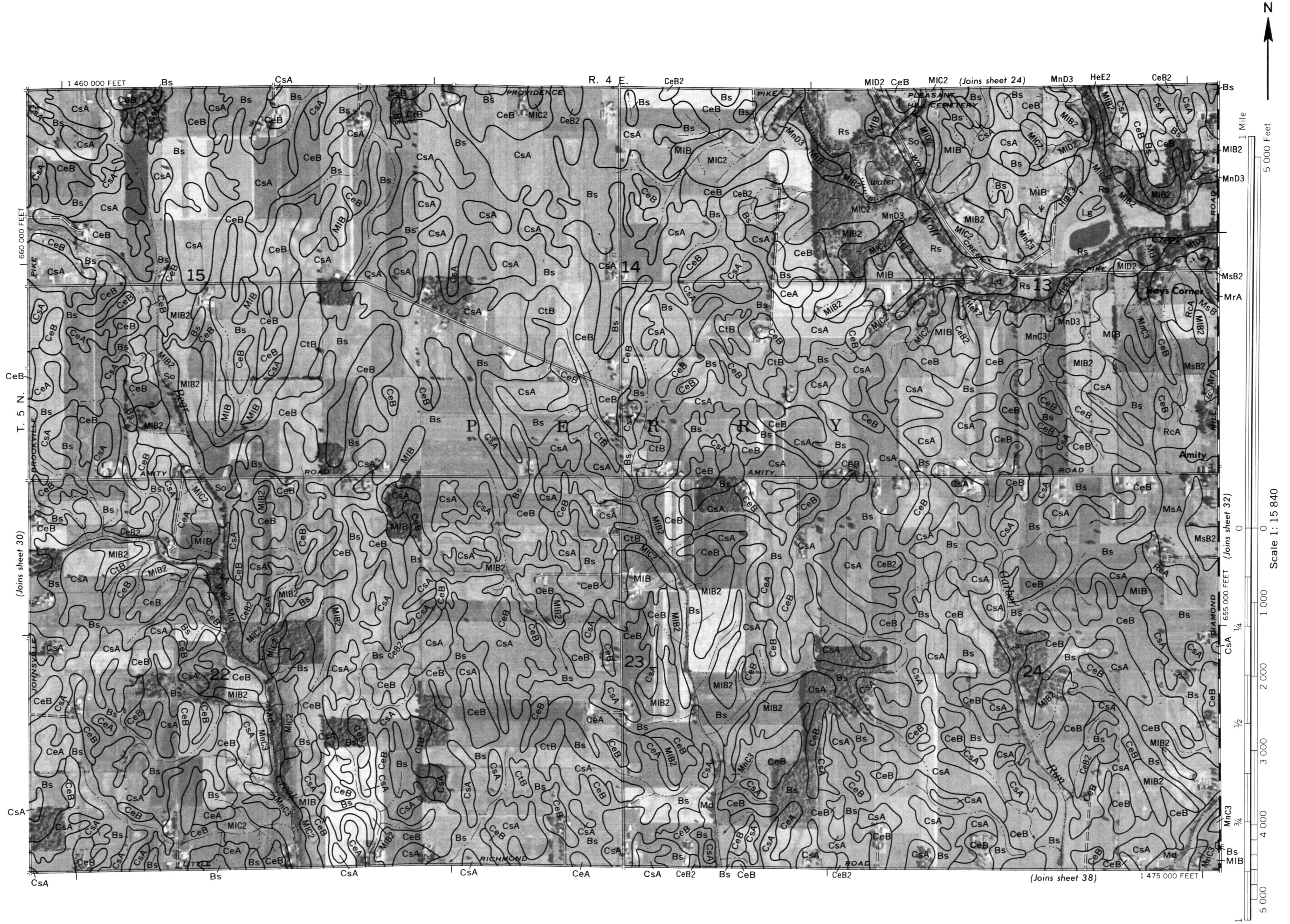
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

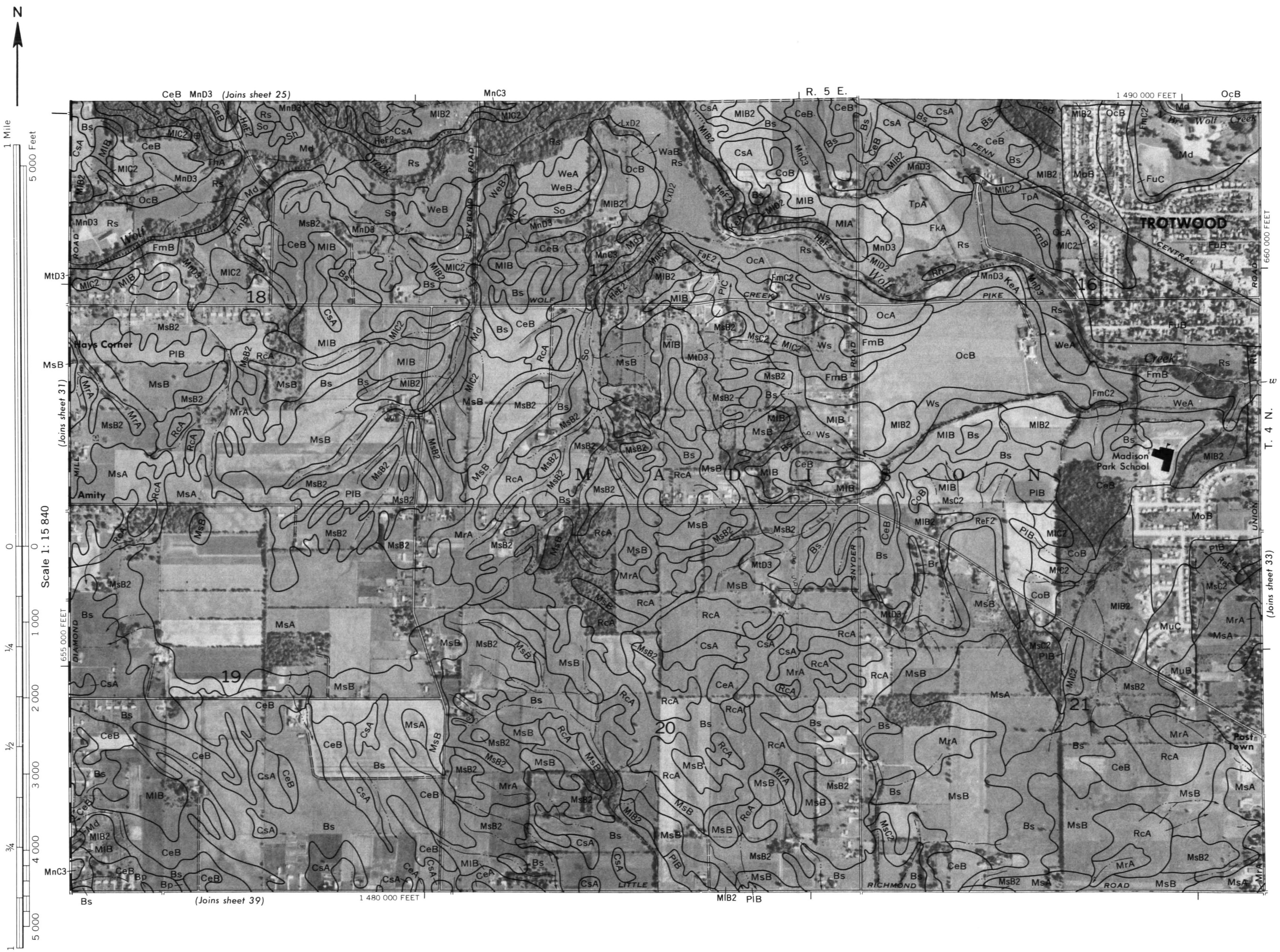
MONTGOMERY COUNTY, OHIO NO. 31

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.





Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

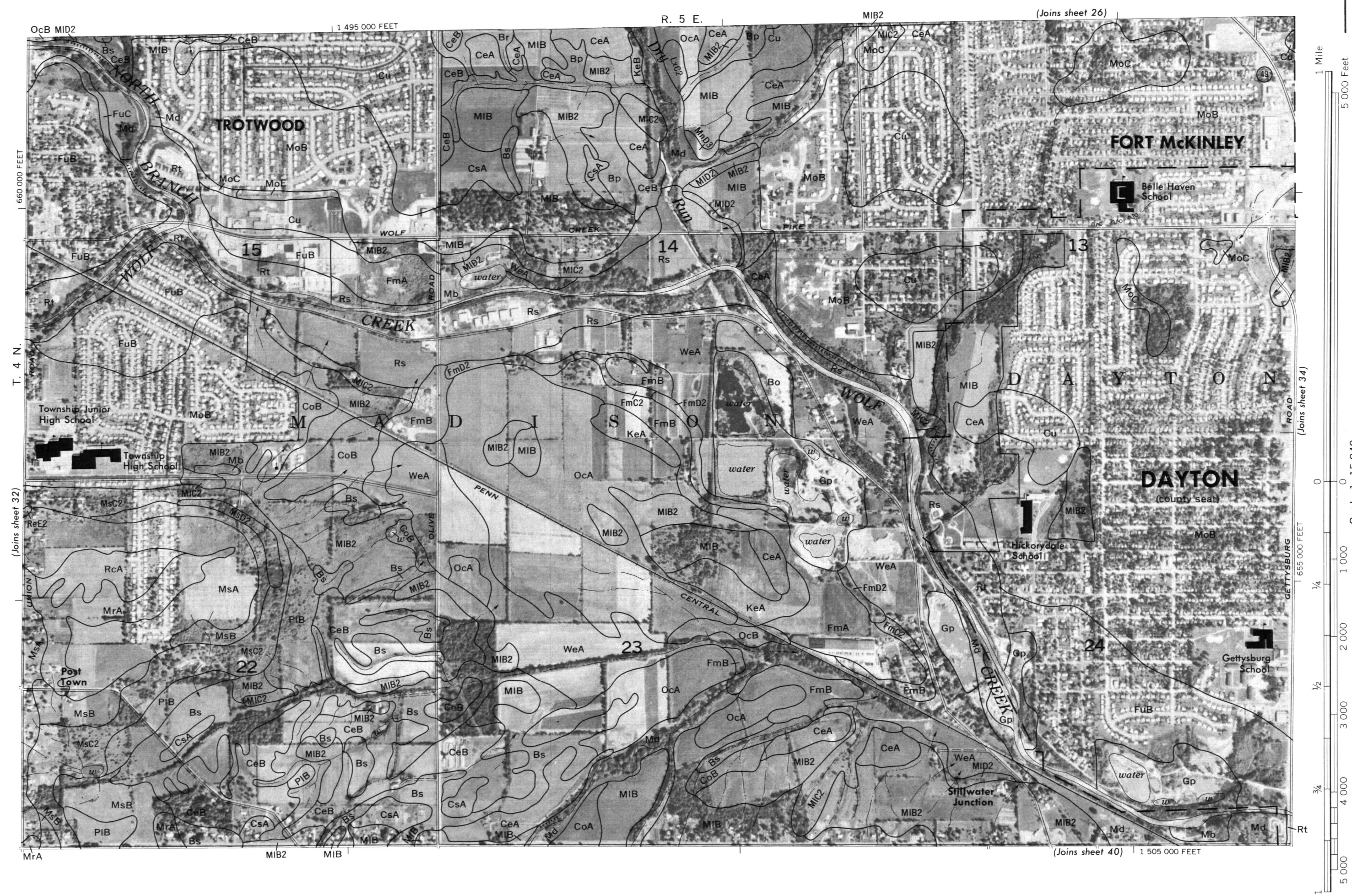
MONTGOMERY COUNTY, OHIO NO. 32

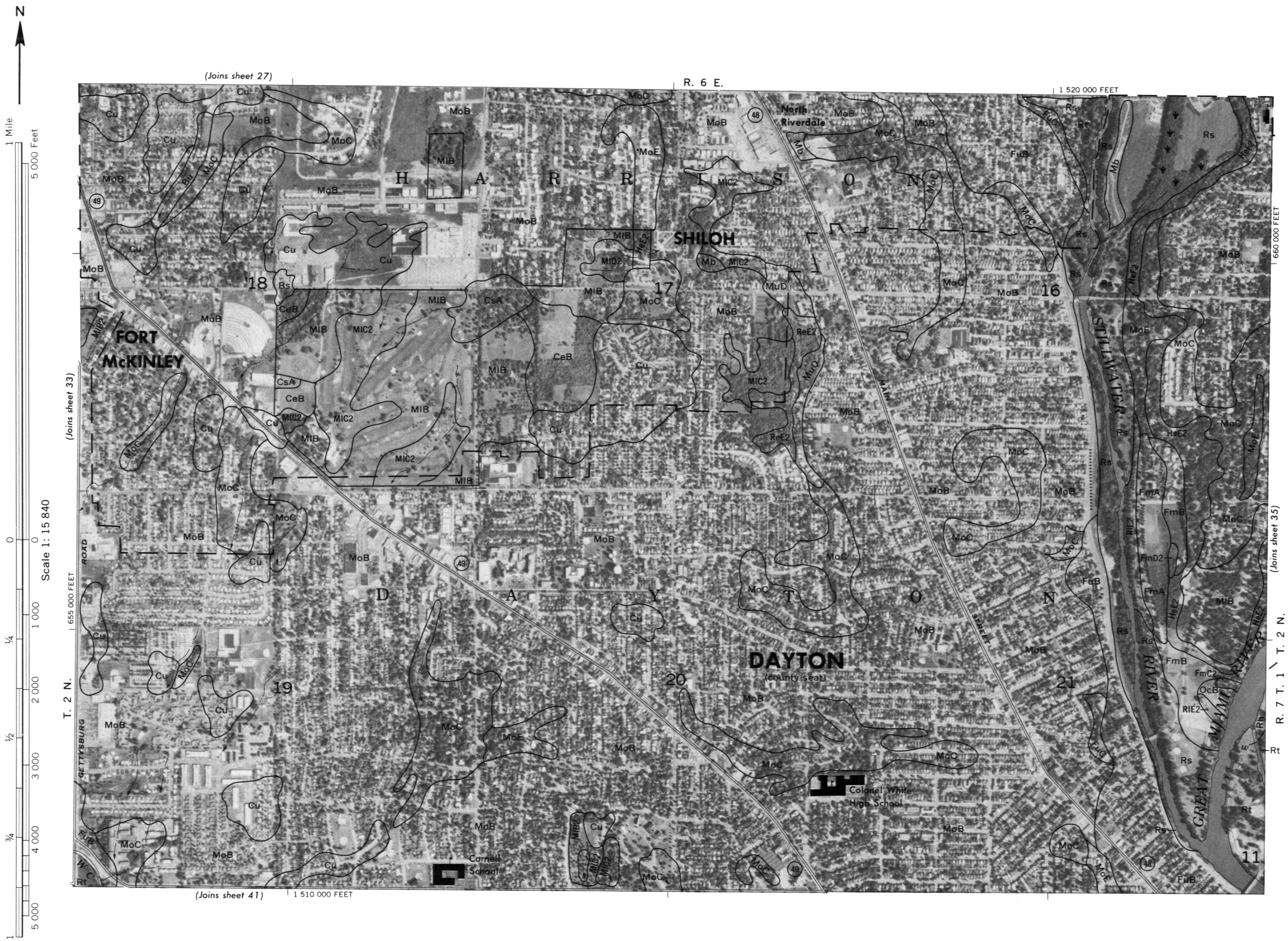
MONTGOMERY COUNTY, OHIO NO. 33

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.





Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

35

MONTGOMERY COUNTY, OHIO NO. 35

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
Land division corners are approximately positioned on this map.

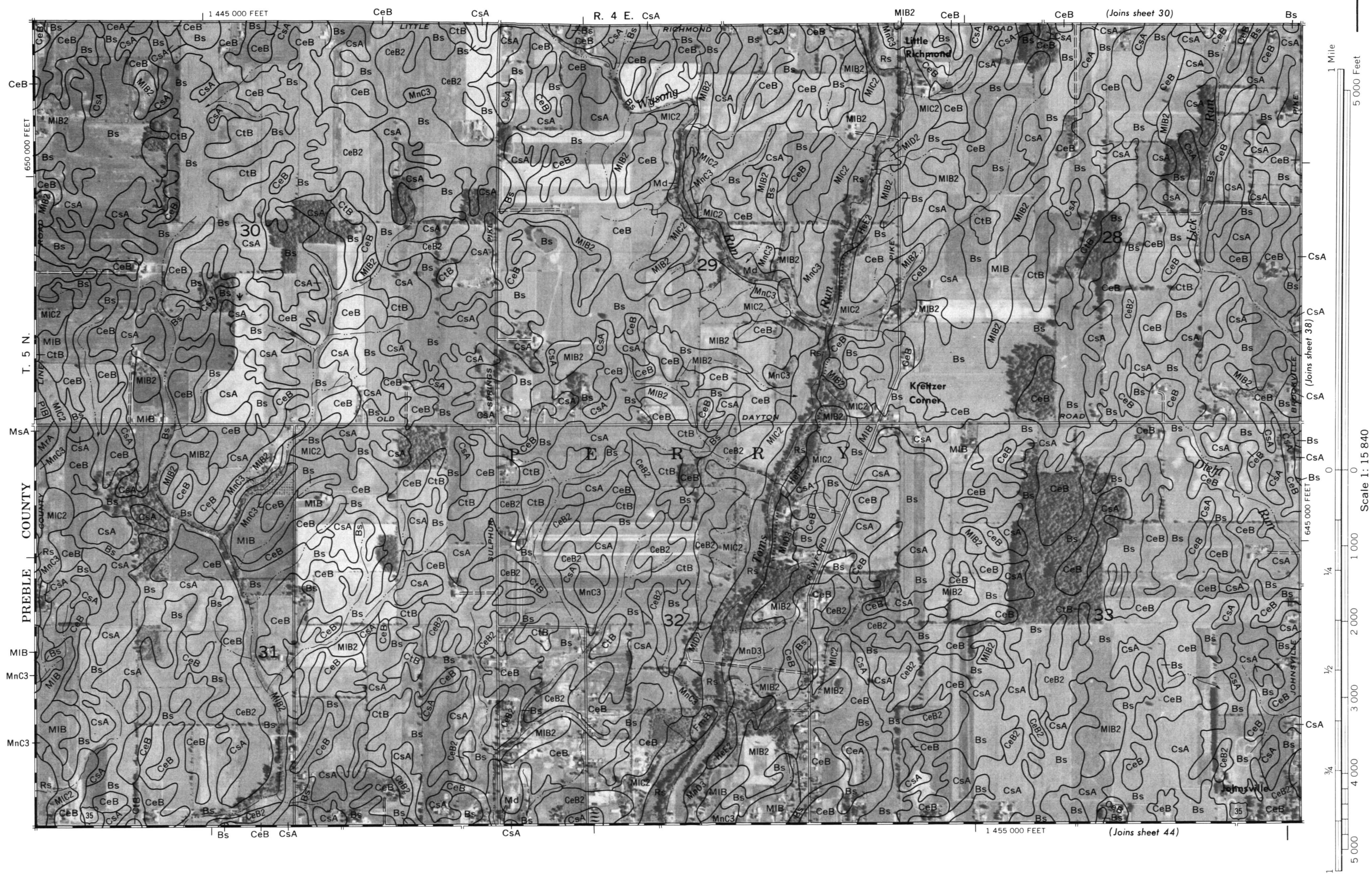
Land division corners are approximately positioned on this map.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 37

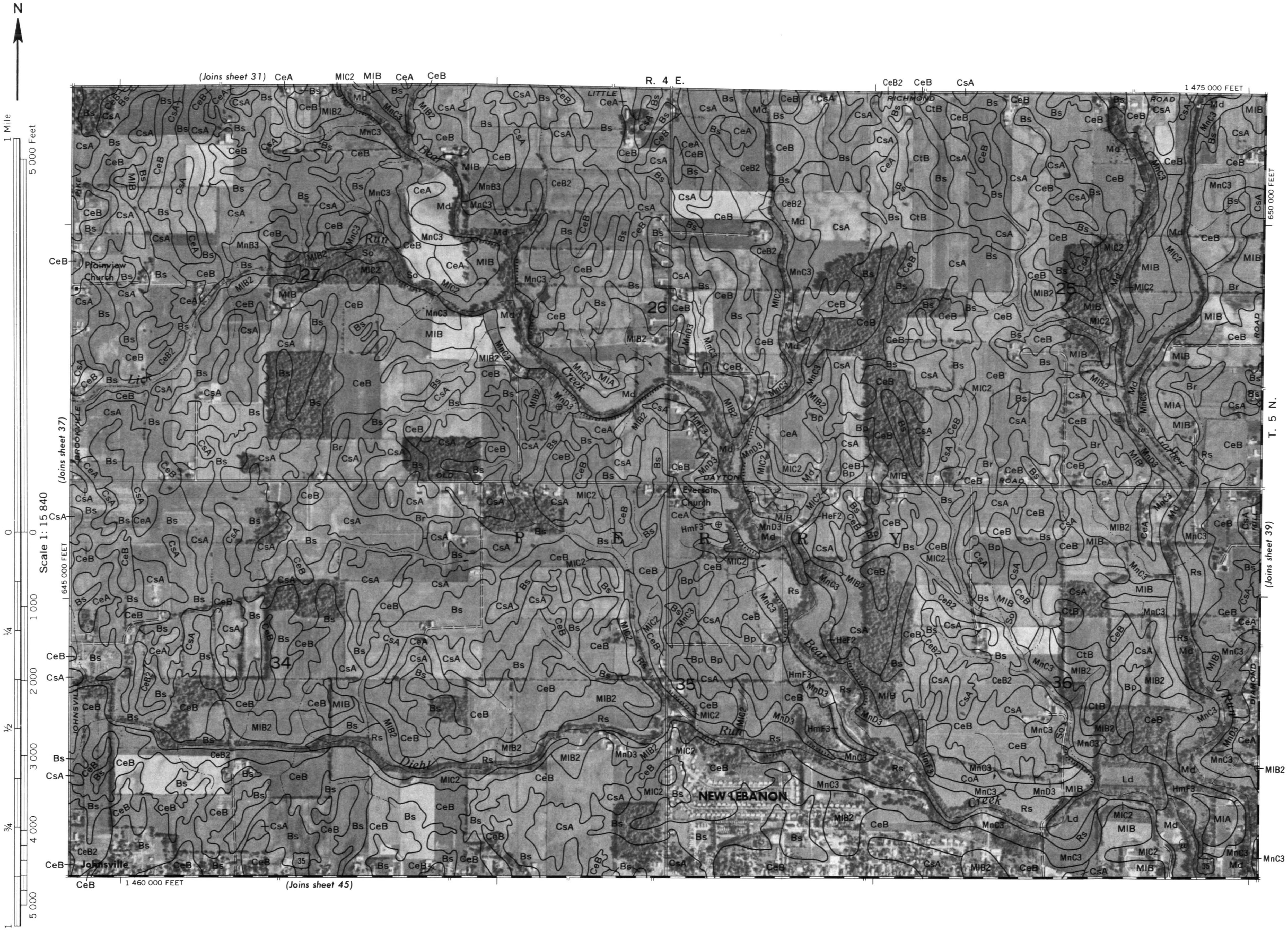
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

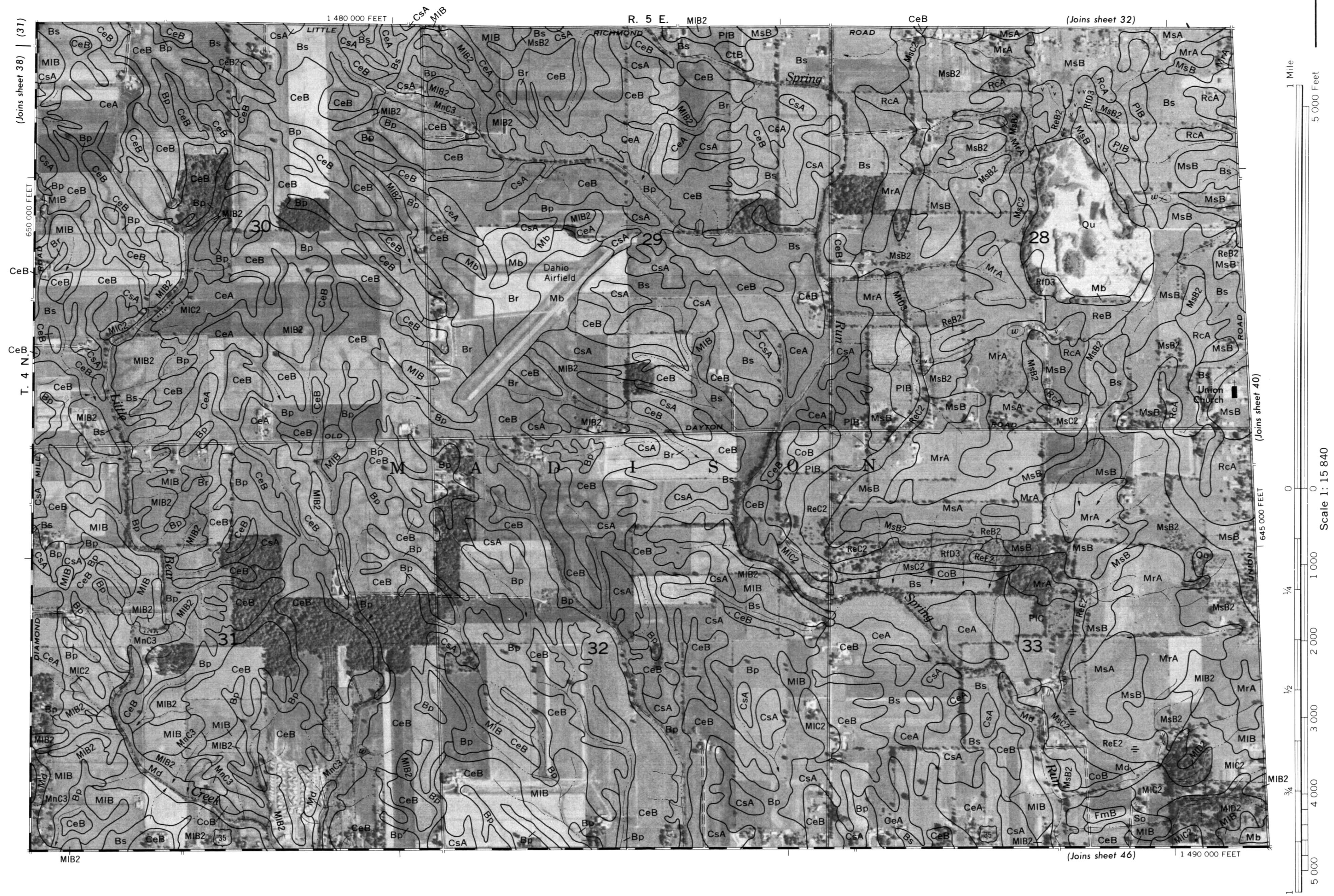
Land division corners are approximately positioned on this map.



MONTGOMERY COUNTY, OHIO — SHEET NUMBER 38



Land division corners are approximately positioned on this map.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

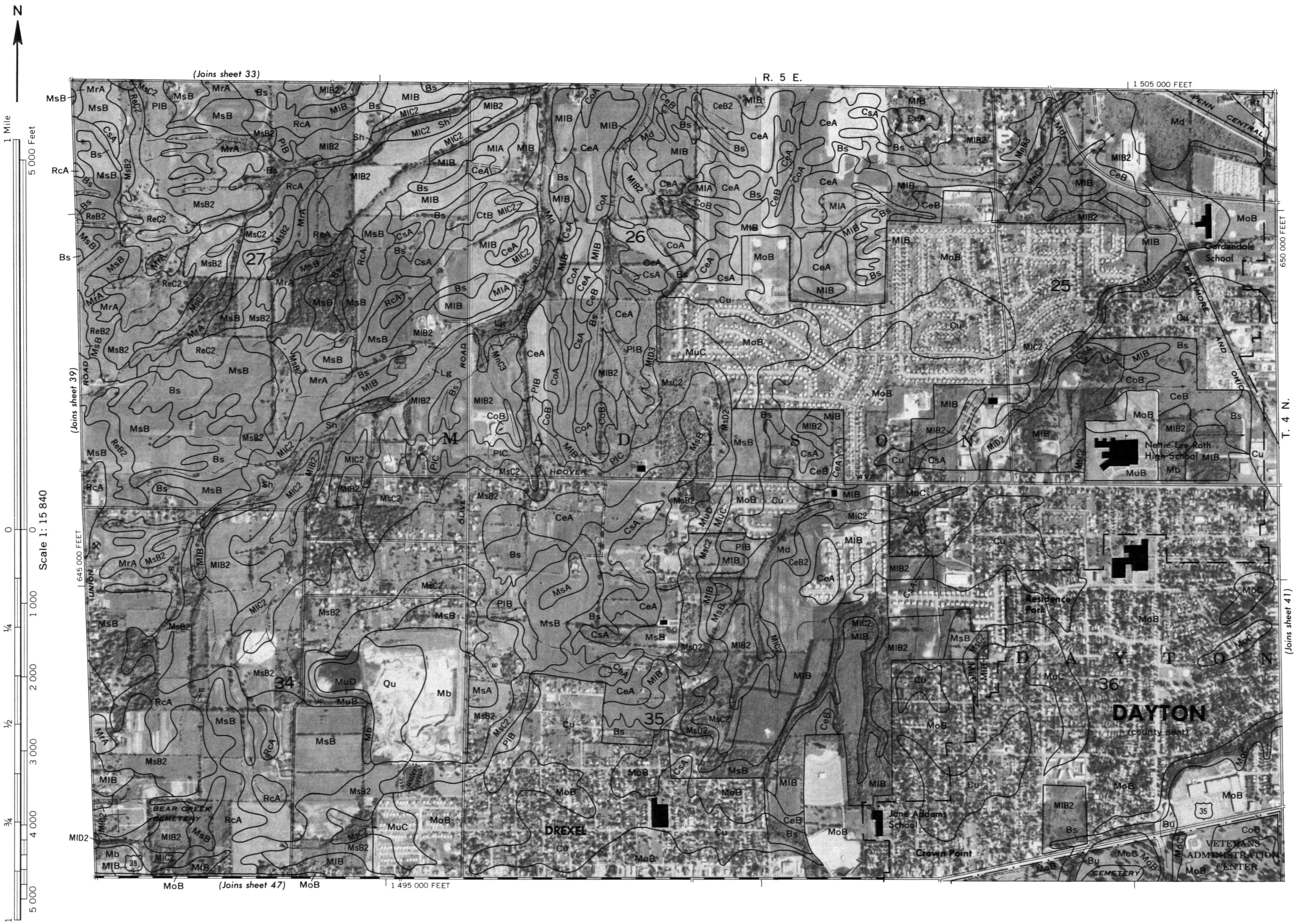


MONTGOMERY COUNTY, OHIO NO. 39

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.



Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

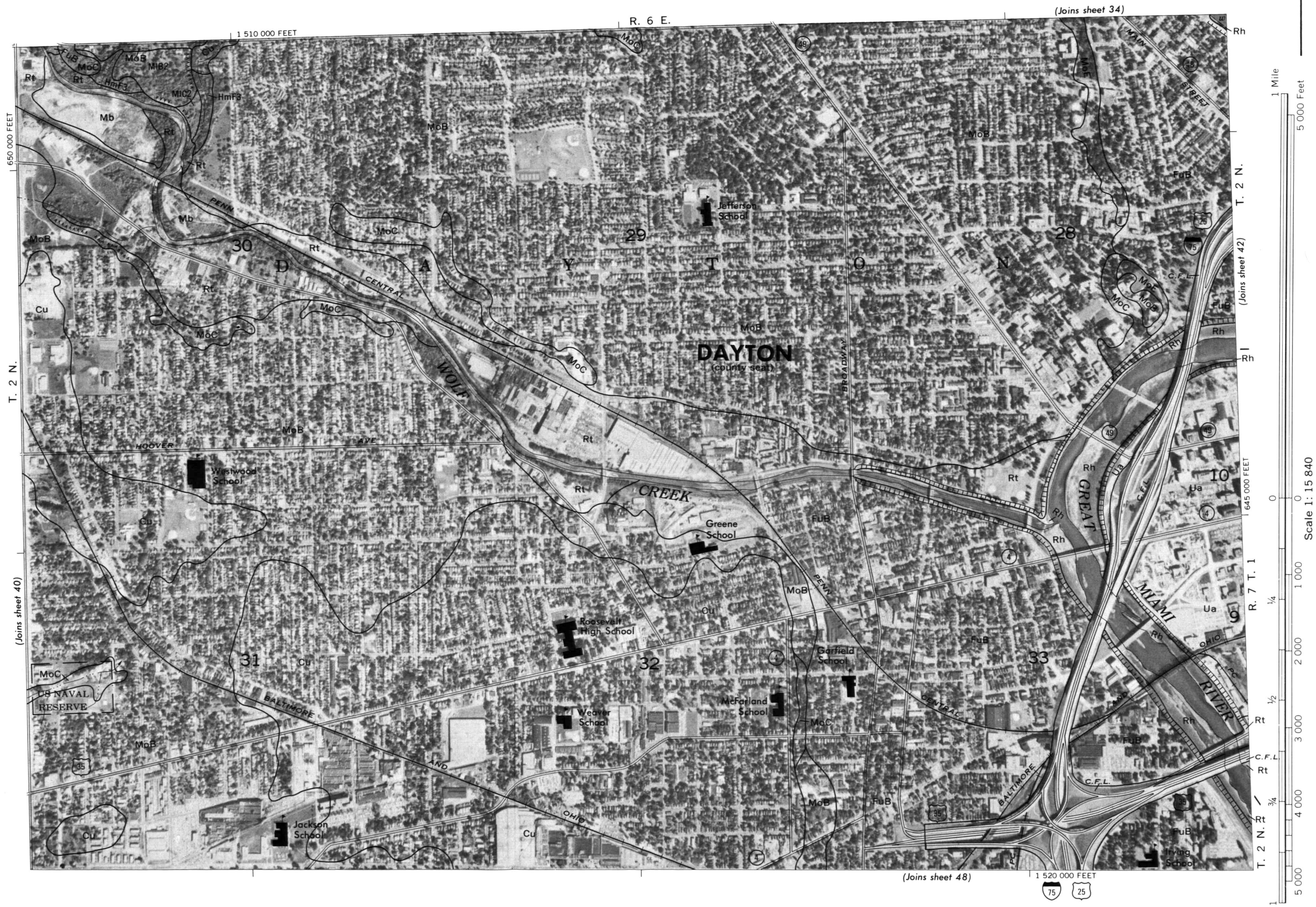
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

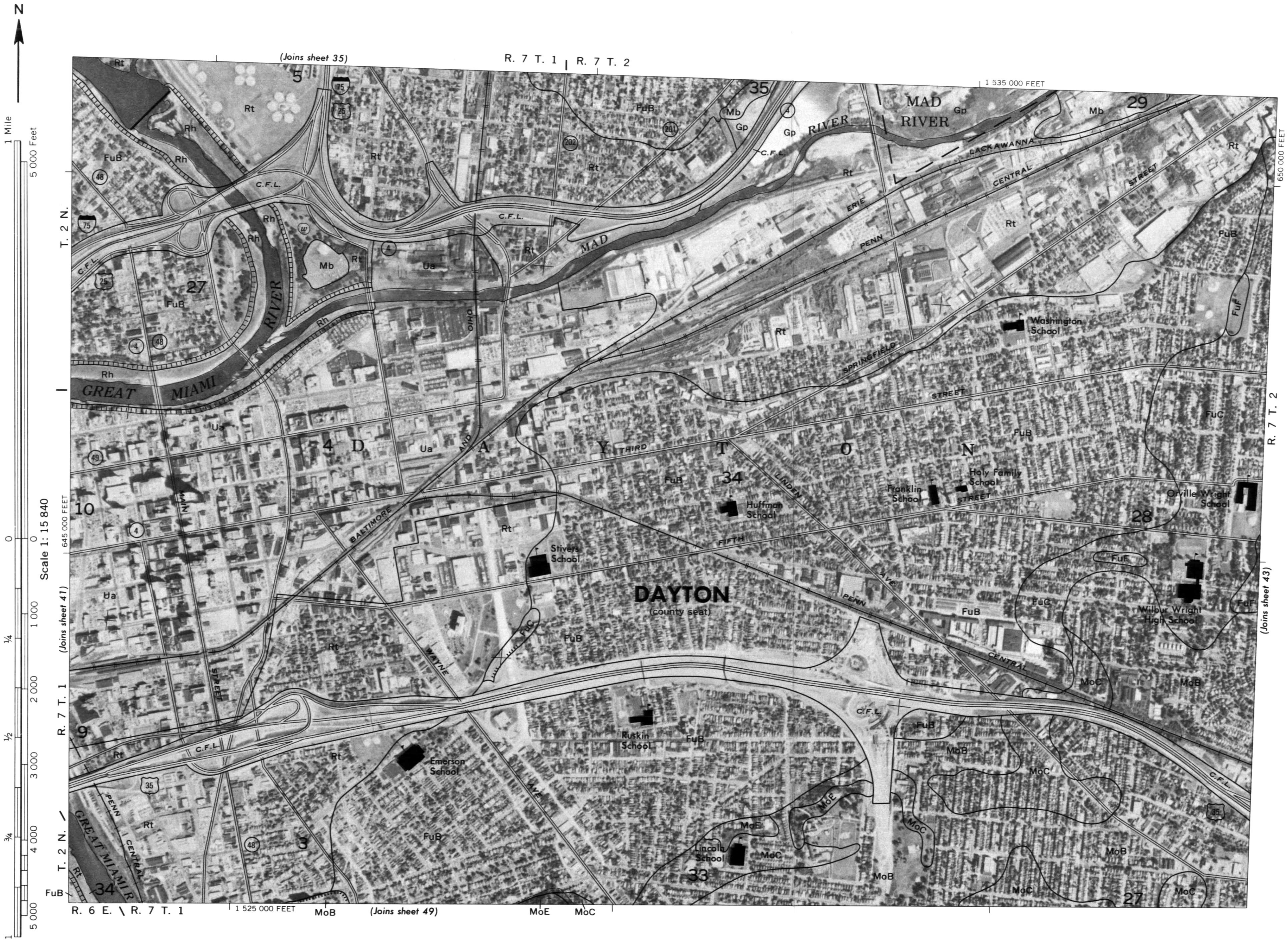
MONTGOMERY COUNTY, OHIO NO. 41

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.





Land division corners are approximately positioned on this map.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

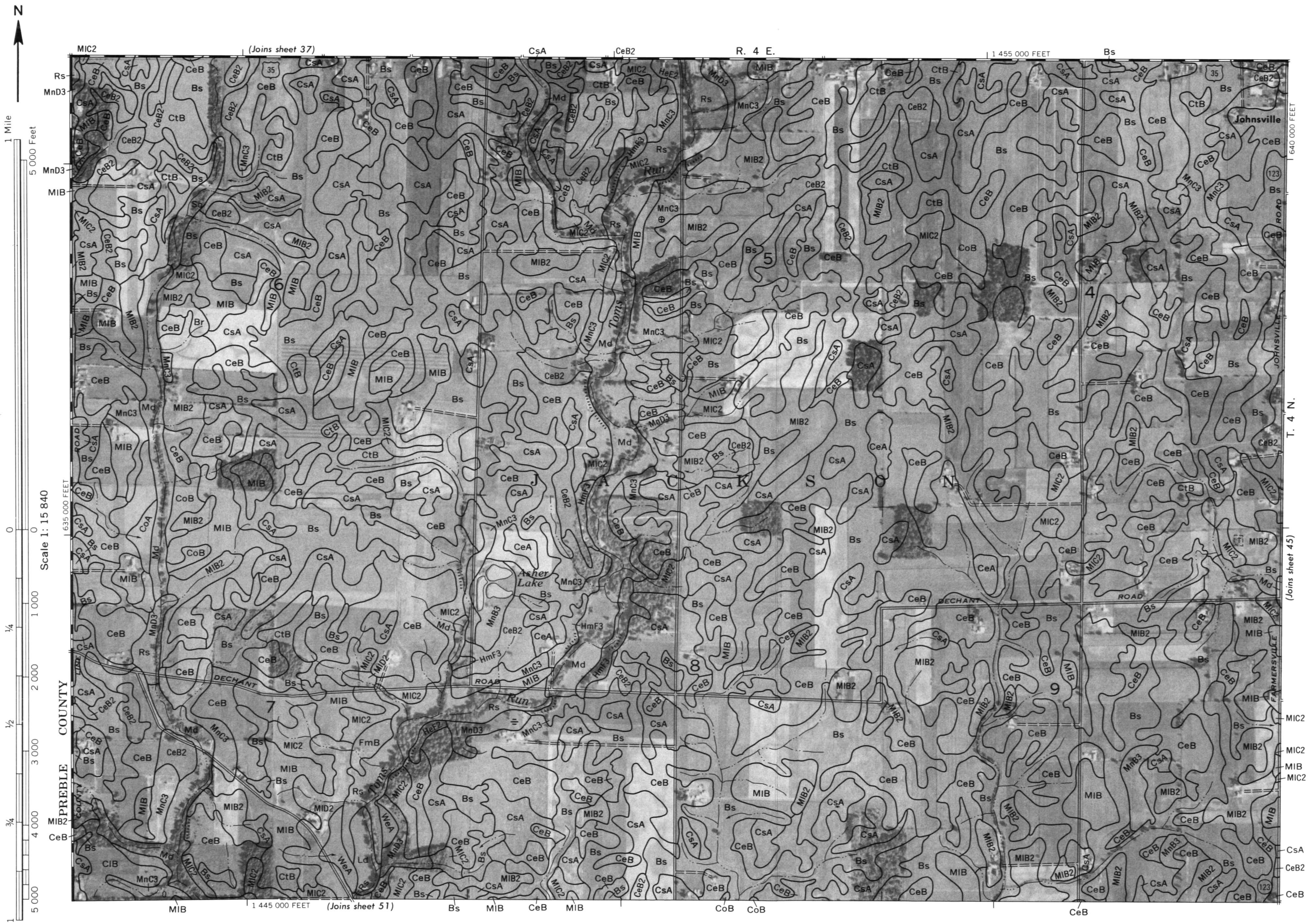
MONTGOMERY COUNTY, OHIO NO. 43

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

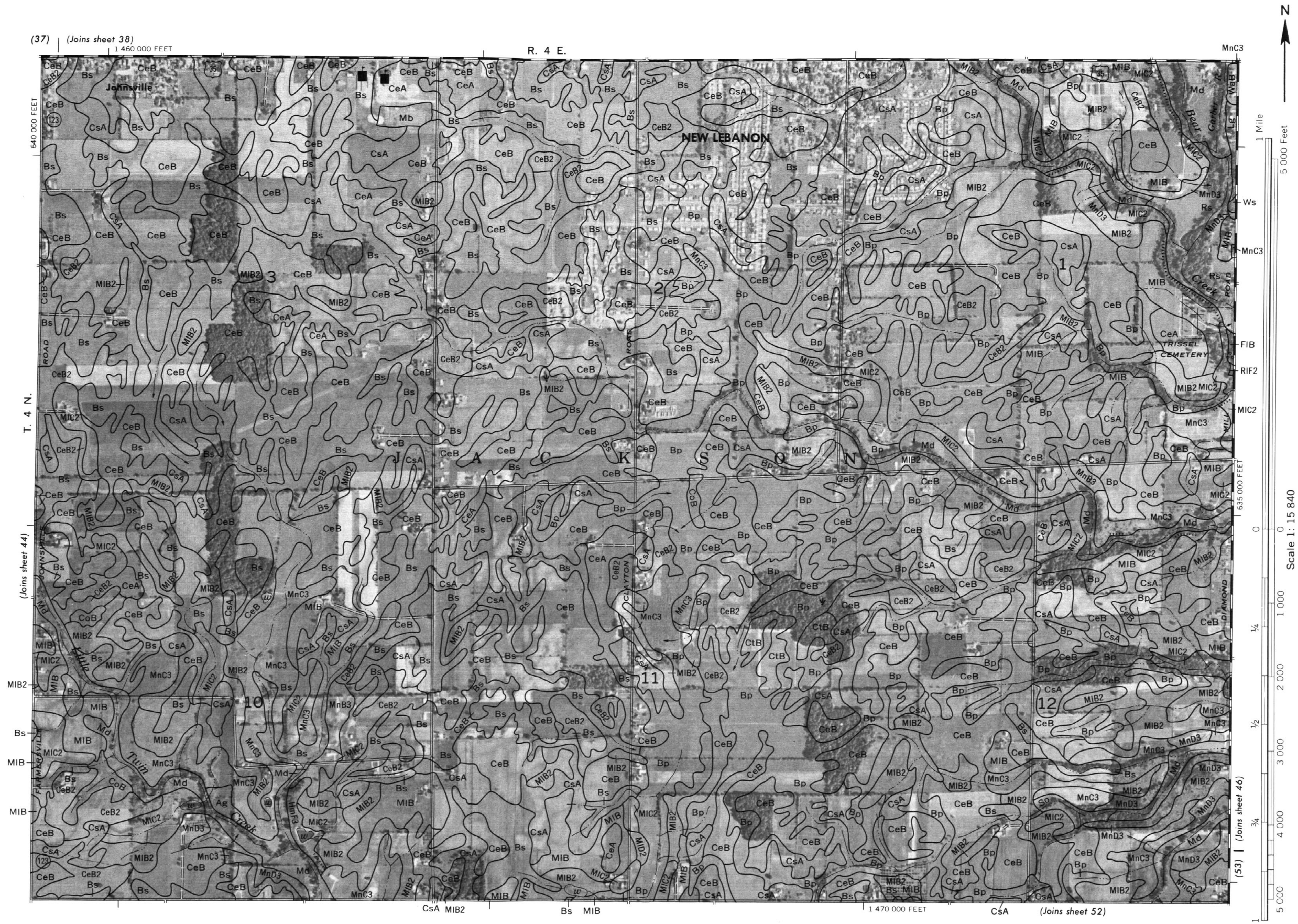
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.

MONTGOMERY COUNTY, OHIO — SHEET NUMBER 44



Land division corners are approximately positioned on this map.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.



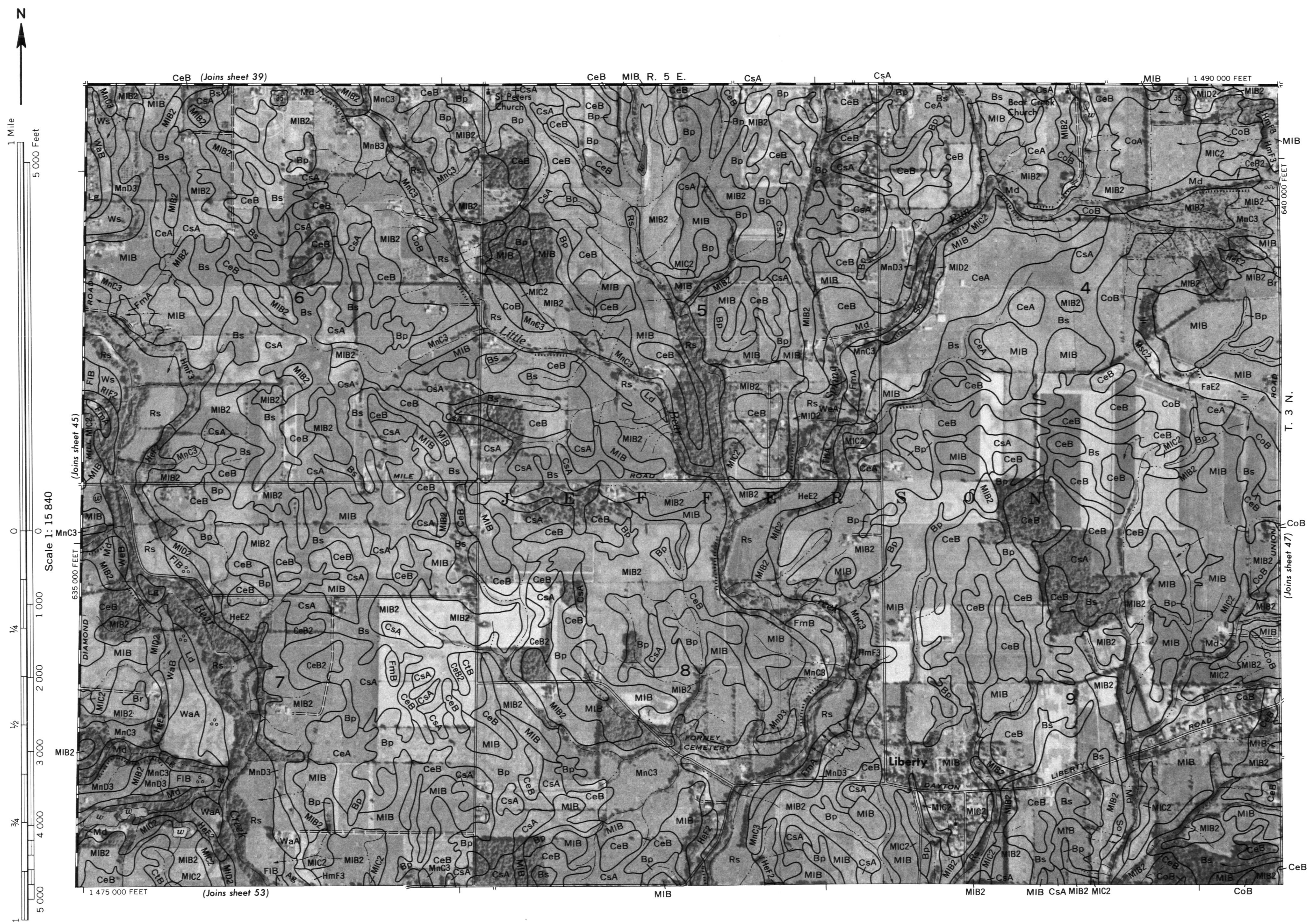
MONTGOMERY COUNTY, OHIO NO. 45

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.

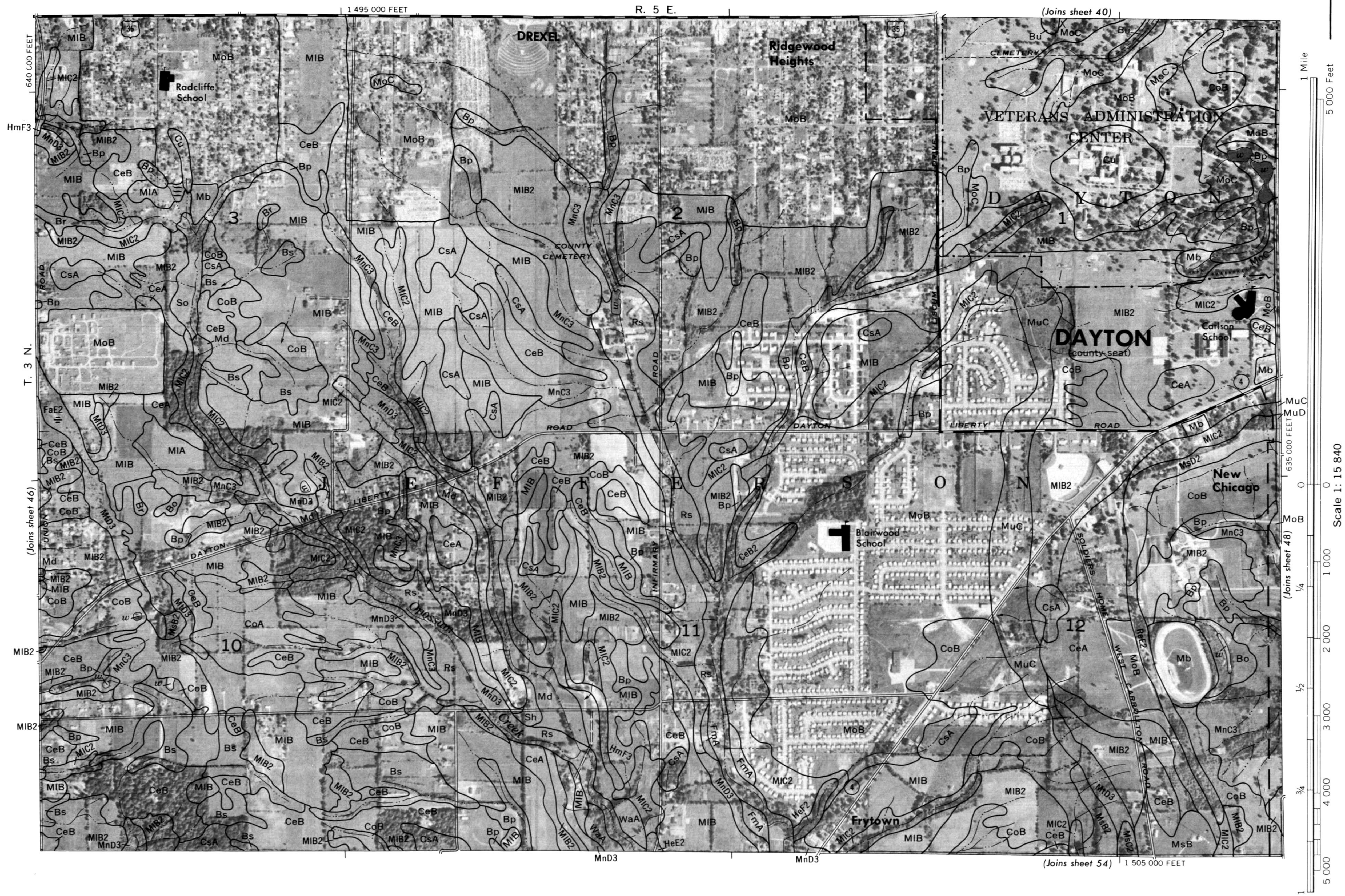
MONTGOMERY COUNTY, OHIO — SHEET NUMBER 46



Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.



MONTGOMERY COUNTY, OHIO NO. 47

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.

MONTGOMERY COUNTY, OHIO — SHEET NUMBER 48

Land division corners are approximately positioned on this map.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 48

MONTGOMERY COUNTY, OHIO NO. 49

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.

Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

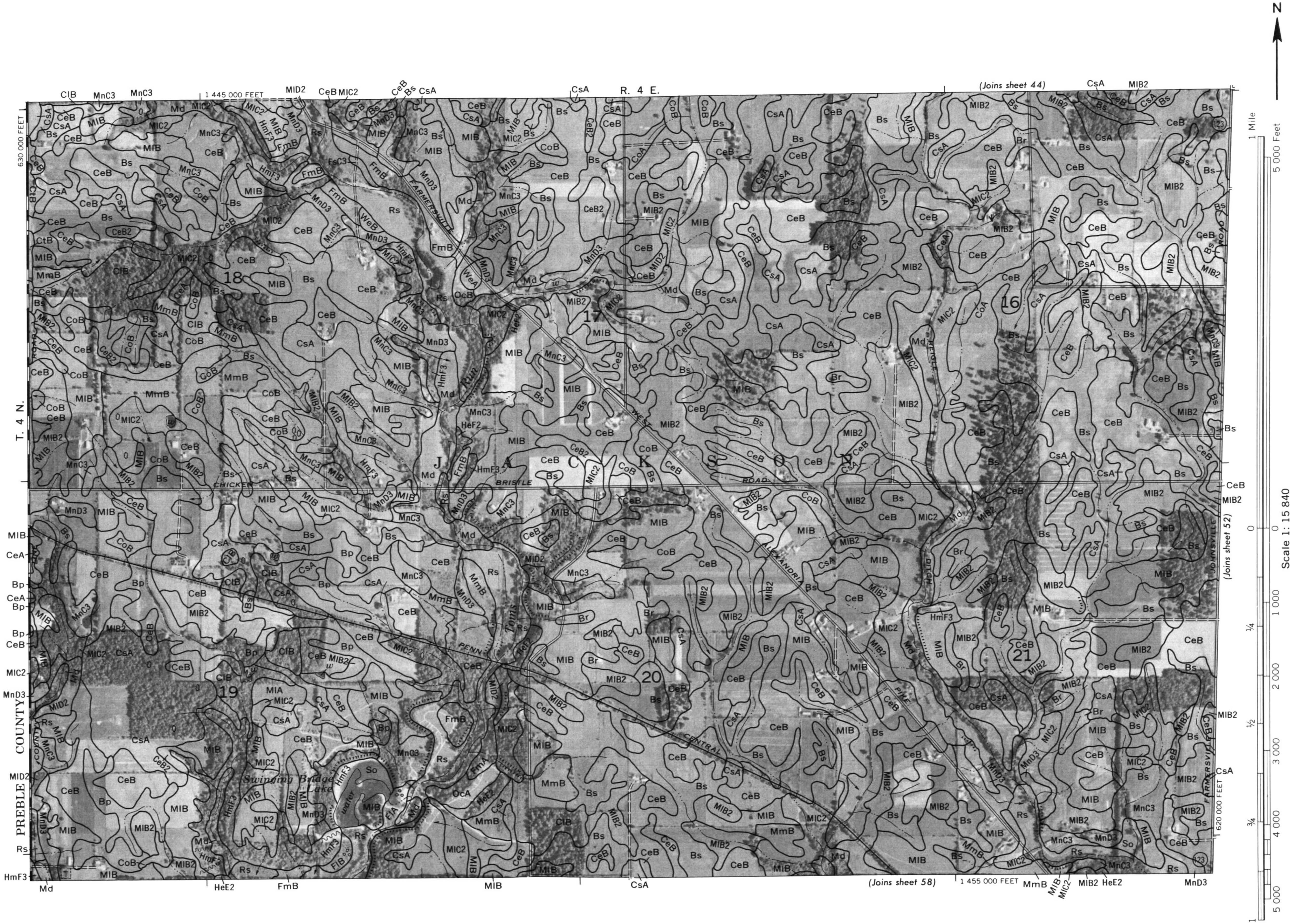
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 51

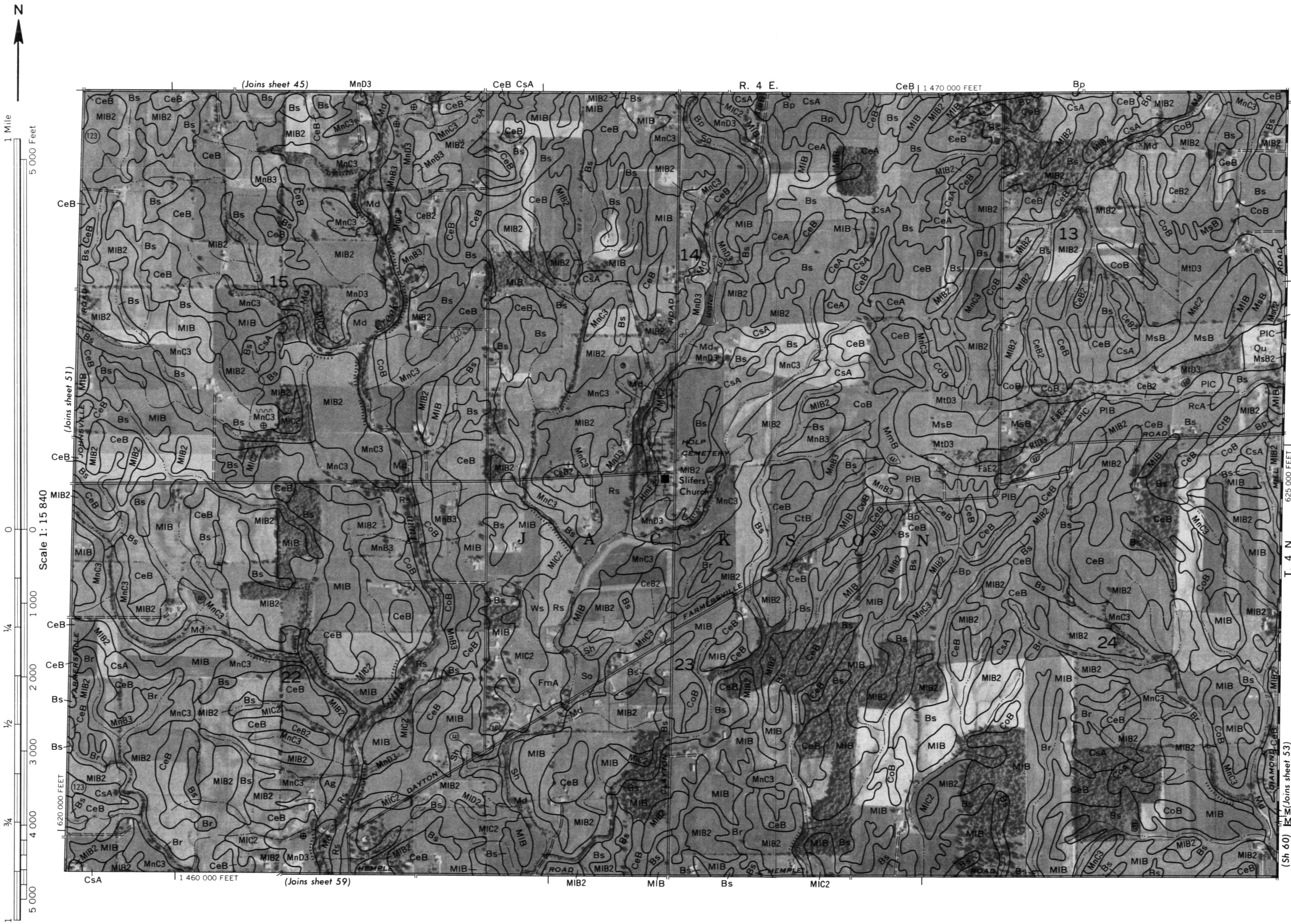
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.



MONTGOMERY COUNTY, OHIO — SHEET NUMBER 52



Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

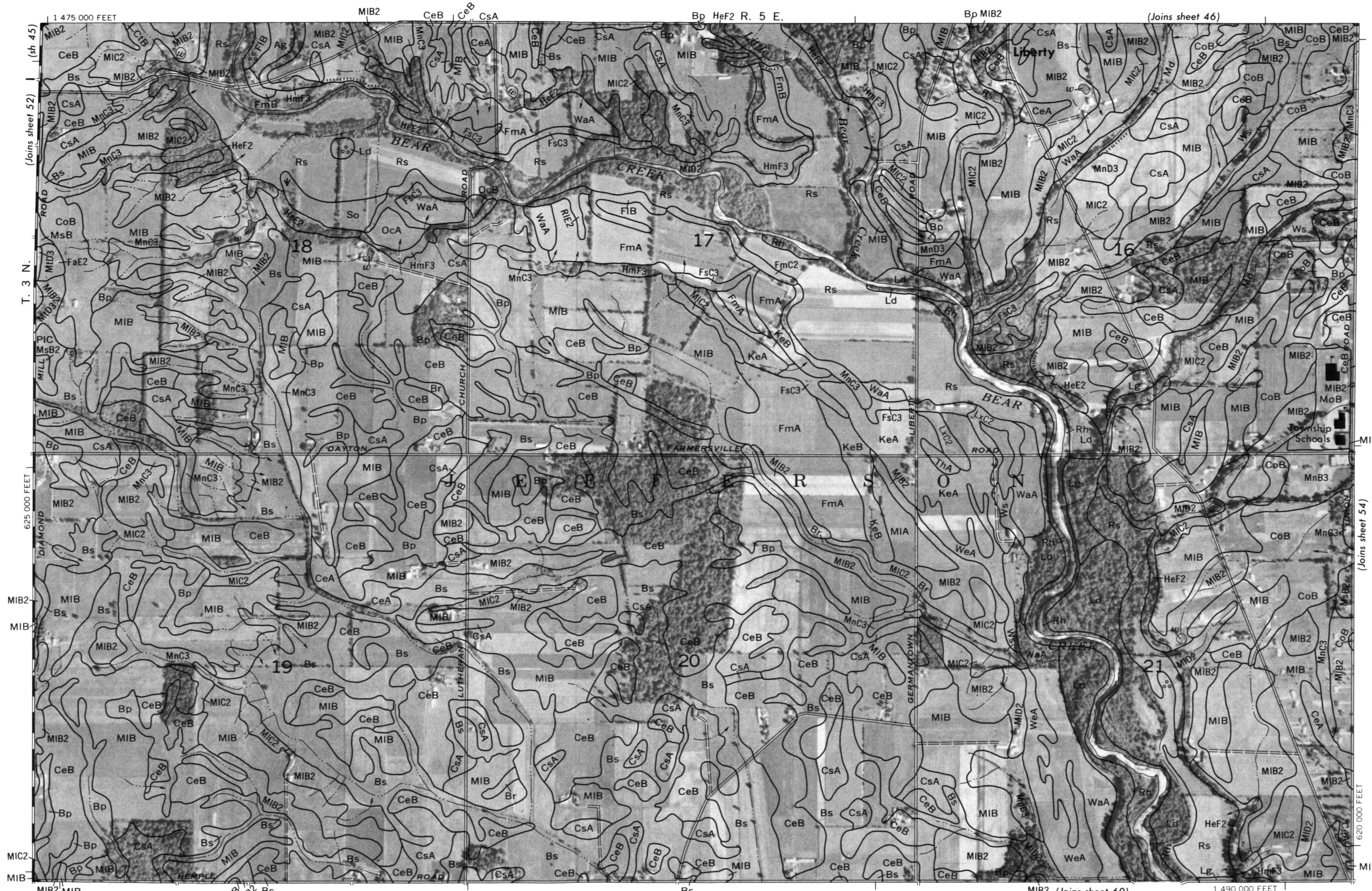
MONTGOMERY COUNTY, OHIO NO. 52

53

N

MONTGOMERY COUNTY, OHIO NO. 53

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
Land division corners are approximately positioned on this map.



Scale 1: 15 840

1 Mile | 5 000 Feet | 0 | 1 000 | 2 000 | 3 000 | 4 000 | 5 000 | ¼ | ½ | ¾

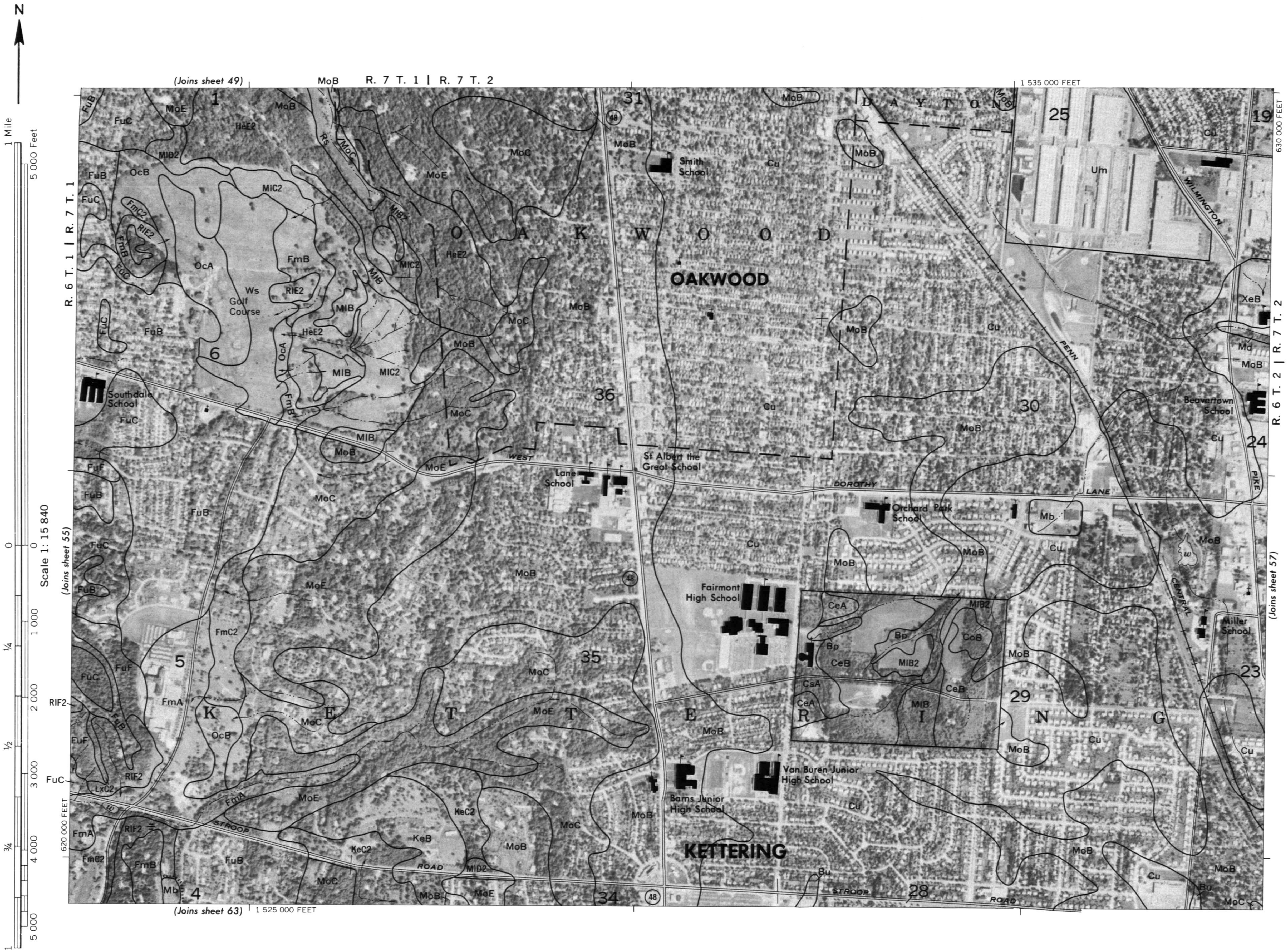
Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 55

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
Land division corners are approximately positioned on this map.



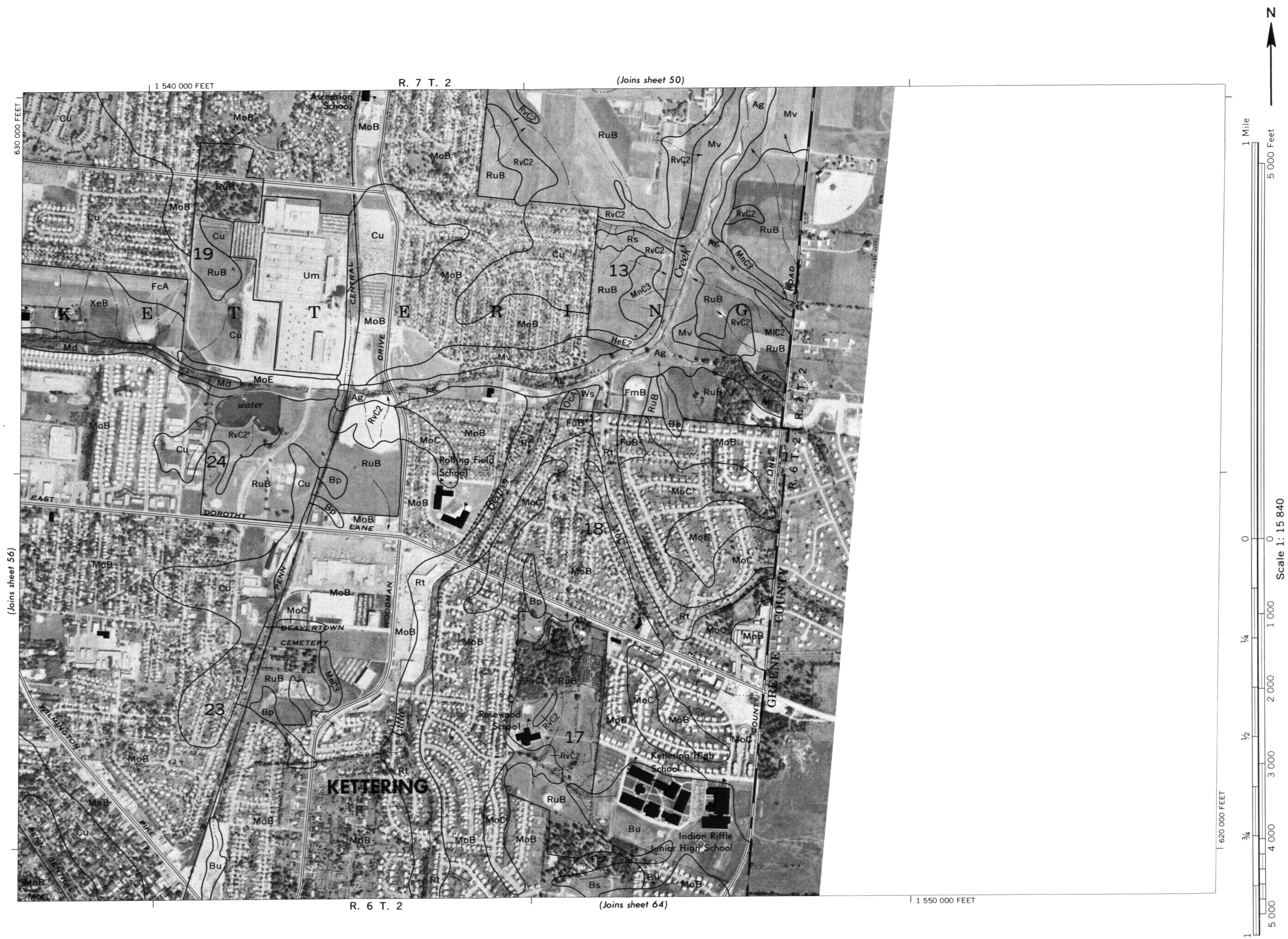
Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 57

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
Land division corners are approximately positioned on this map.



N

1 Mile
5 000 Feet
Scale 1: 15 840

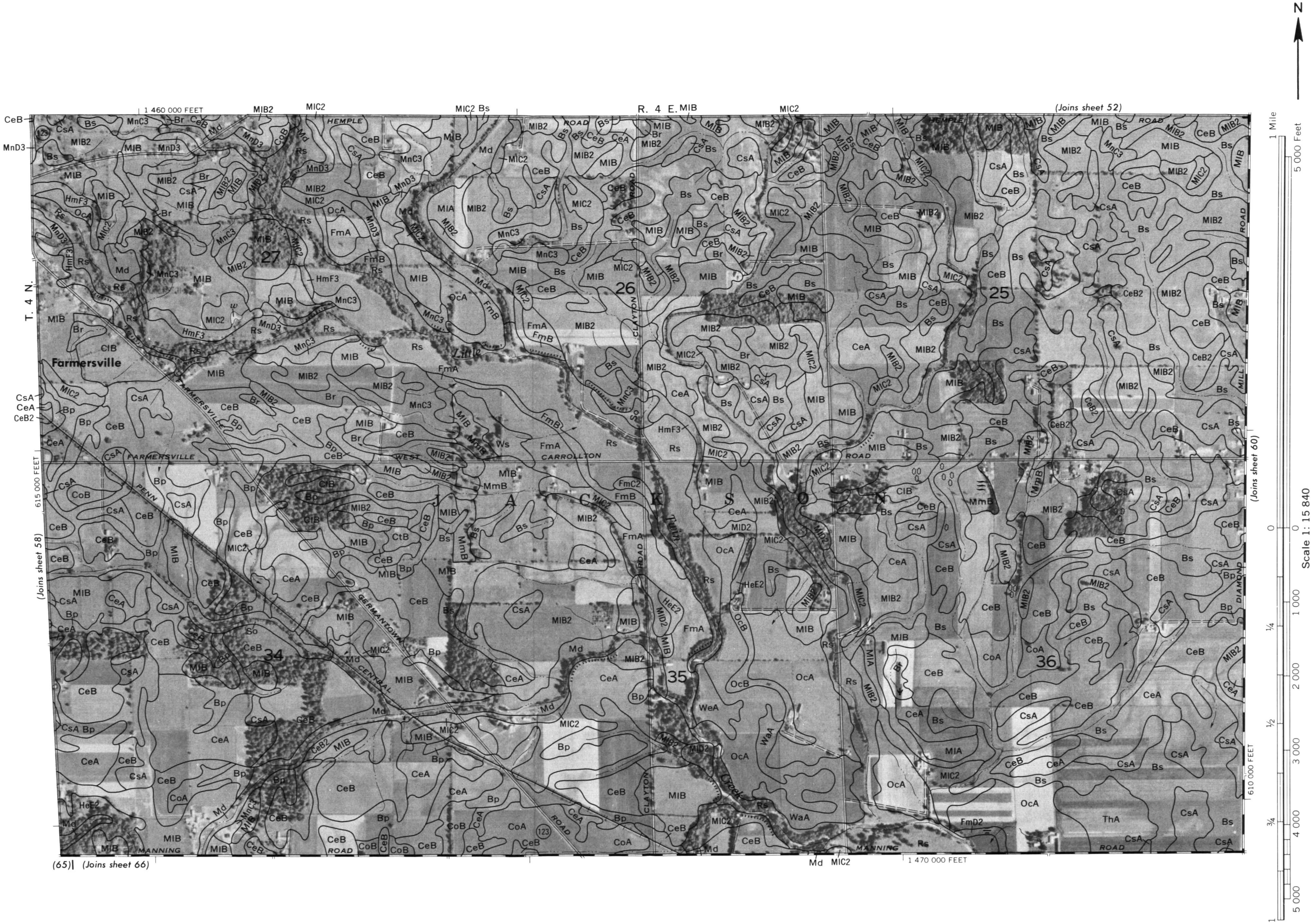
Land division corners are approximately positioned on this map.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 59

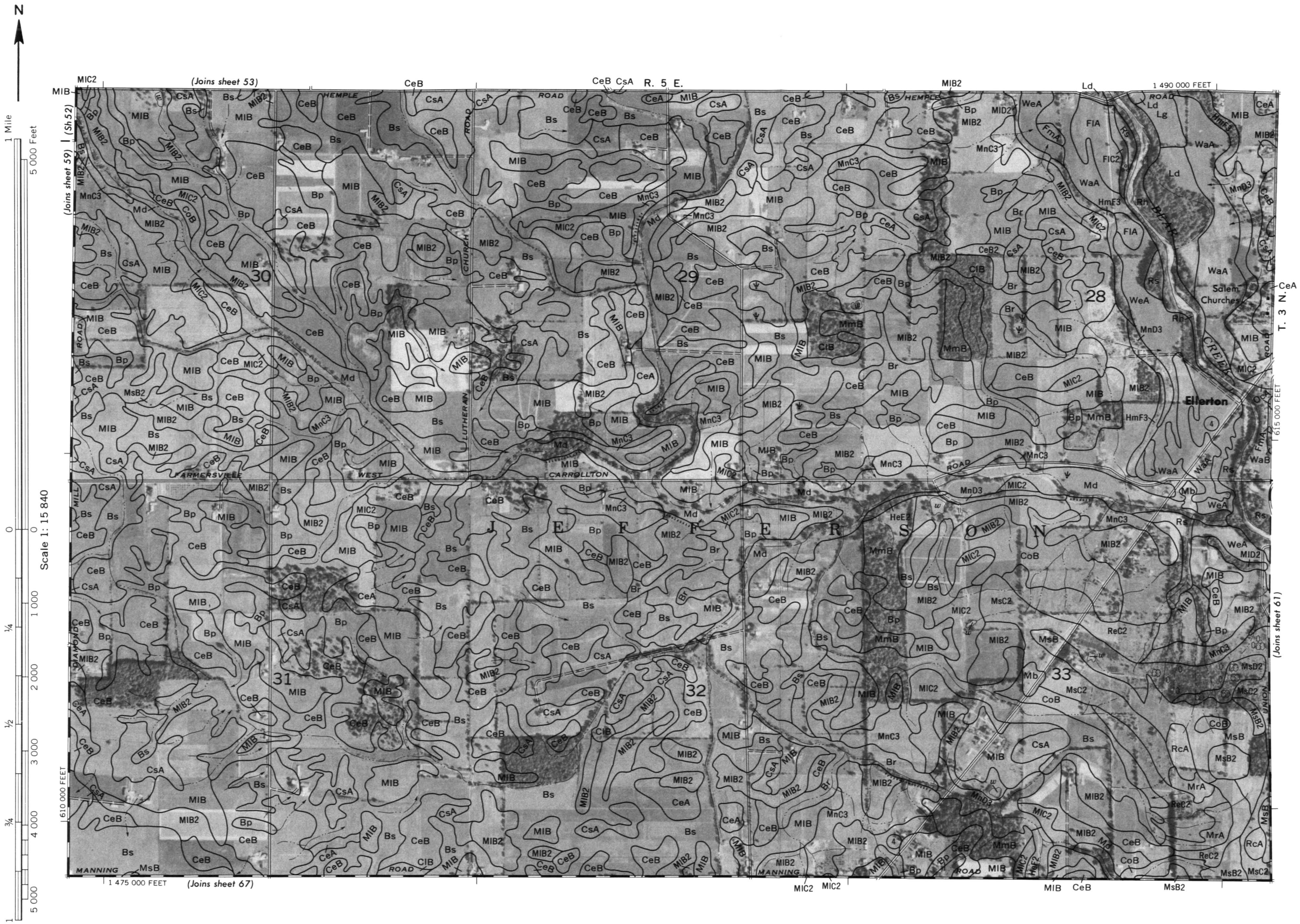
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.



MONTGOMERY COUNTY, OHIO — SHEET NUMBER 60



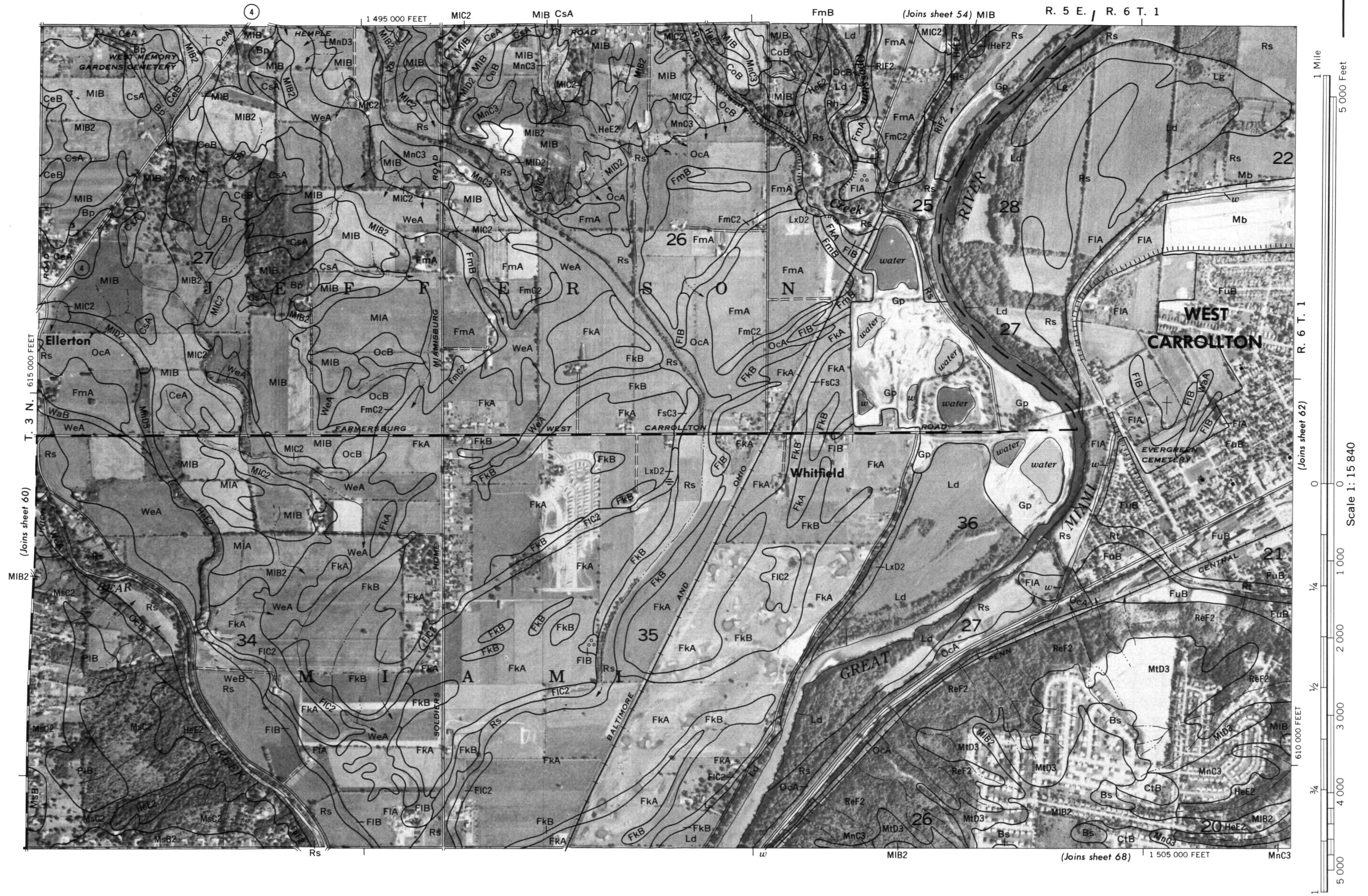
Land division corners are approximately positioned on this map.

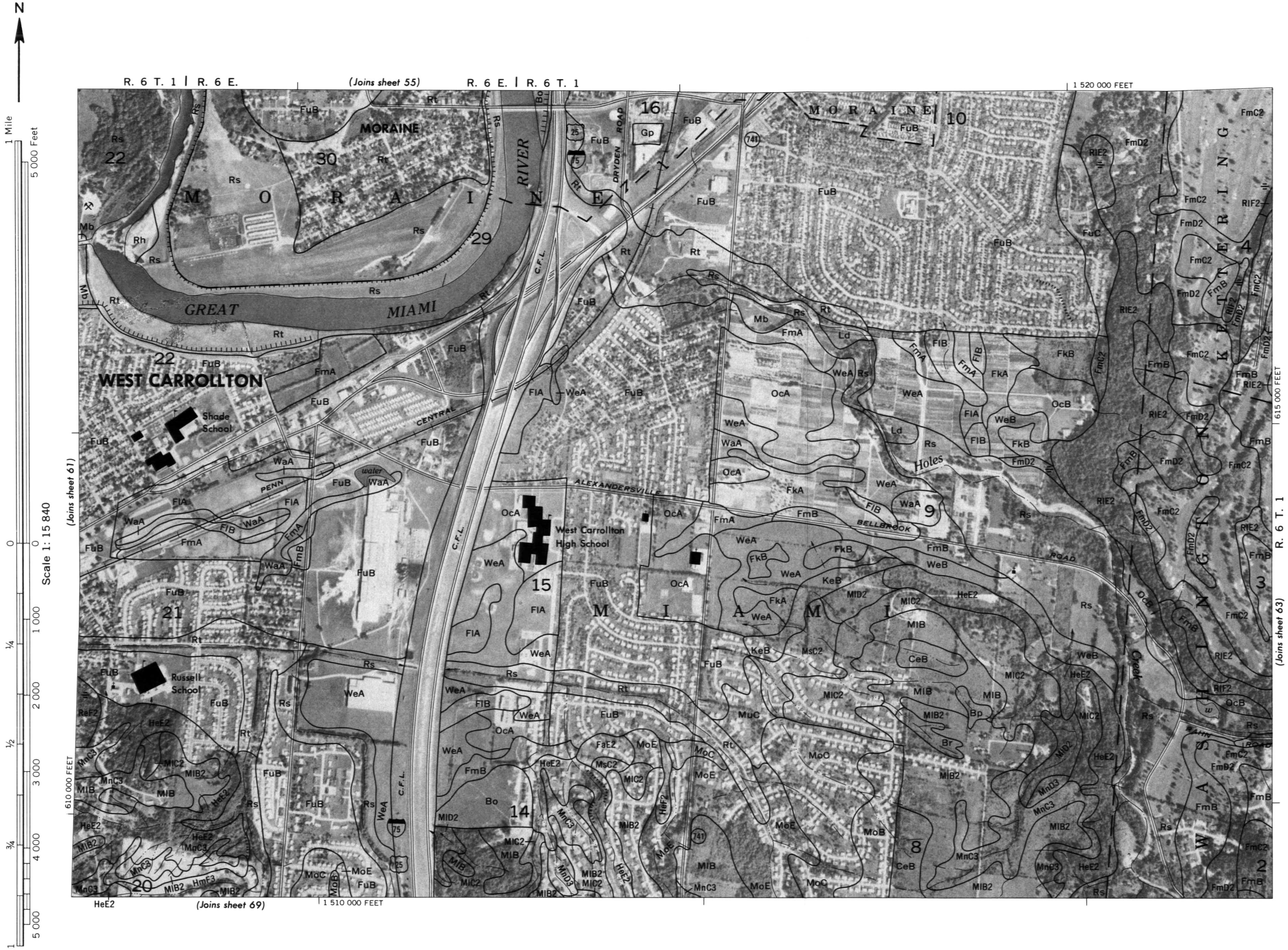
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 61

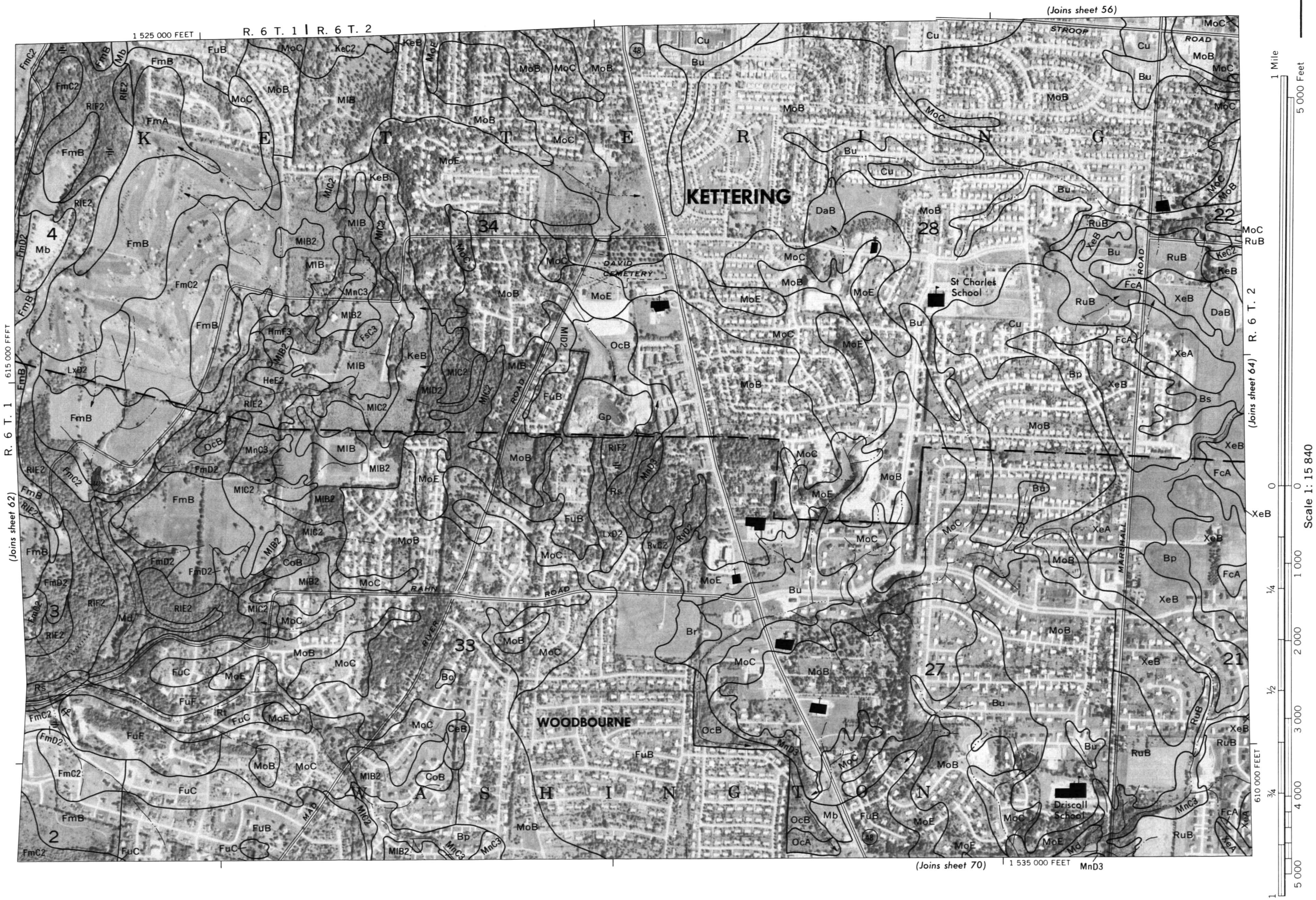
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
Land division corners are approximately positioned on this map.





Land division corners are approximately positioned on this map.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

63



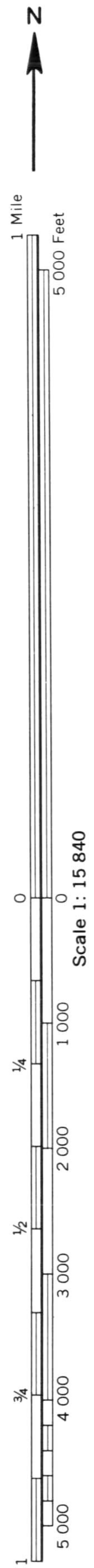
MONTGOMERY COUNTY, OHIO NO. 63

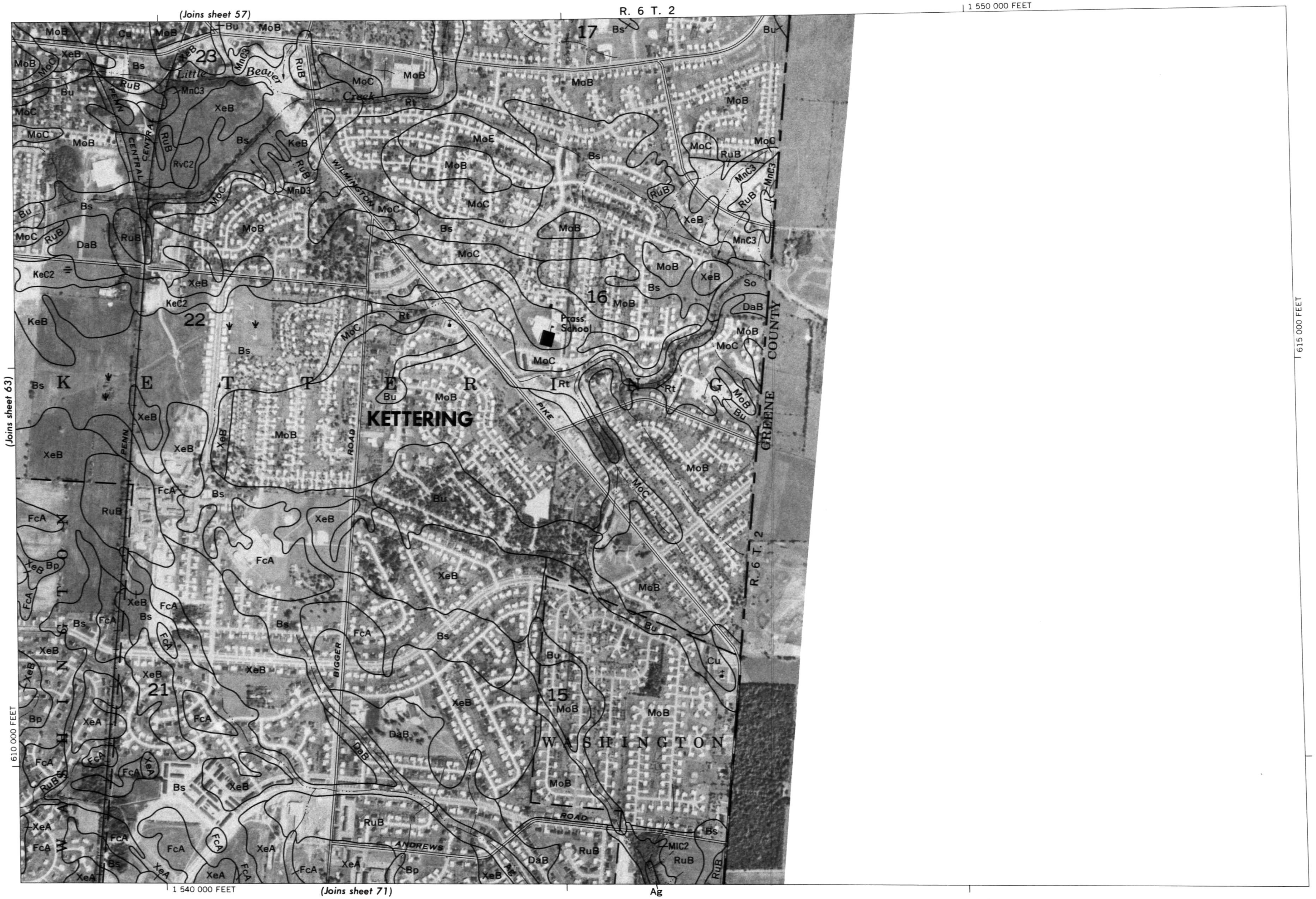
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.

MONTGOMERY COUNTY, OHIO — SHEET NUMBER 64



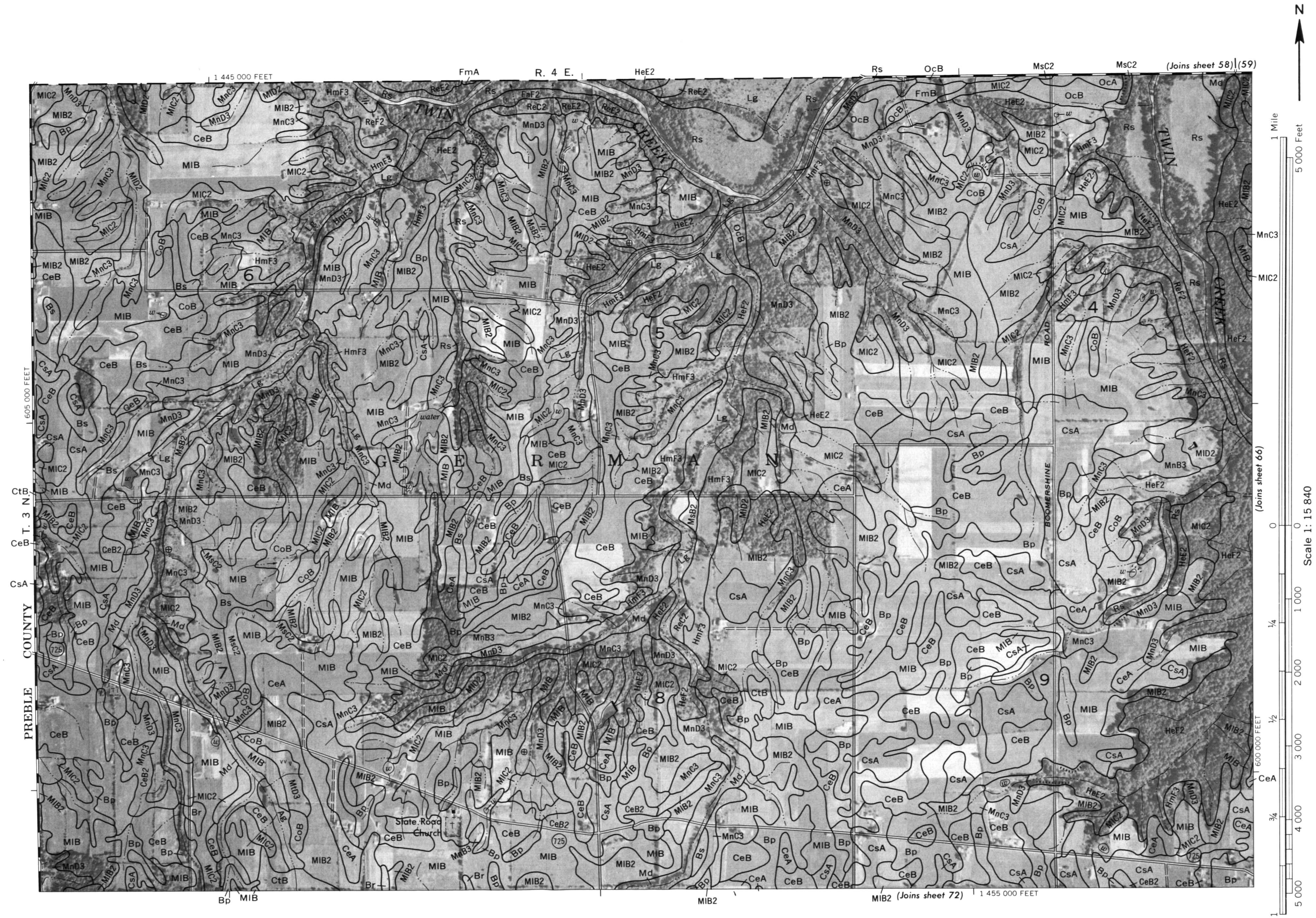


Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 64



MONTGOMERY COUNTY, OHIO NO. 65

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

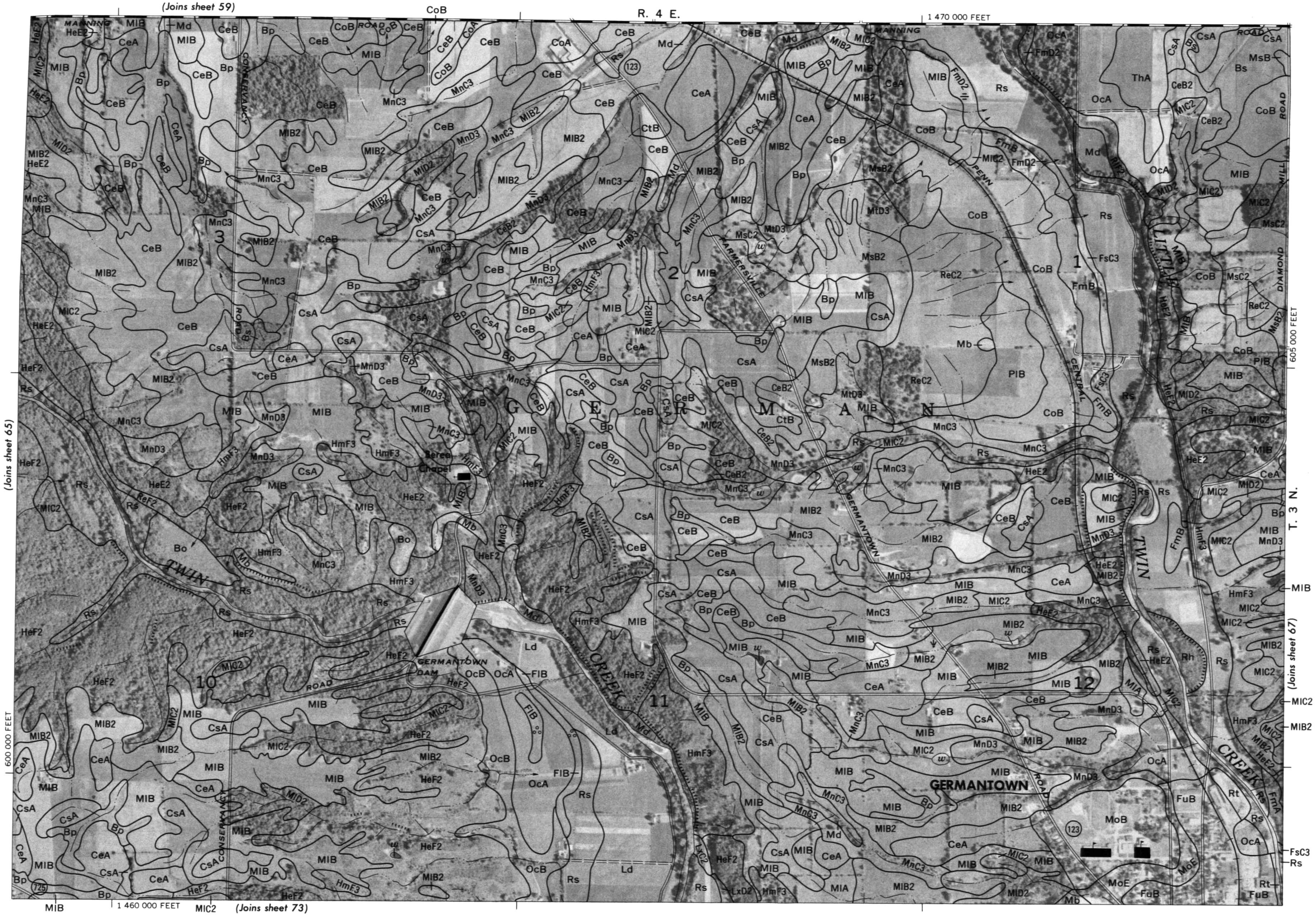
Land division corners are approximately positioned on this map.

N

Scale 1: 15 840

1 Mile ¾ ½ ¼ 0

5 000 Feet 4 000 3 000 2 000 1 000 0



Land division corners are approximately positioned on this map.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 67

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.

Land division corners are approximately positioned on this map.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 69

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.

MONTGOMERY COUNTY, OHIO — SHEET NUMBER 70

Land division corners are approximately positioned on this map.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

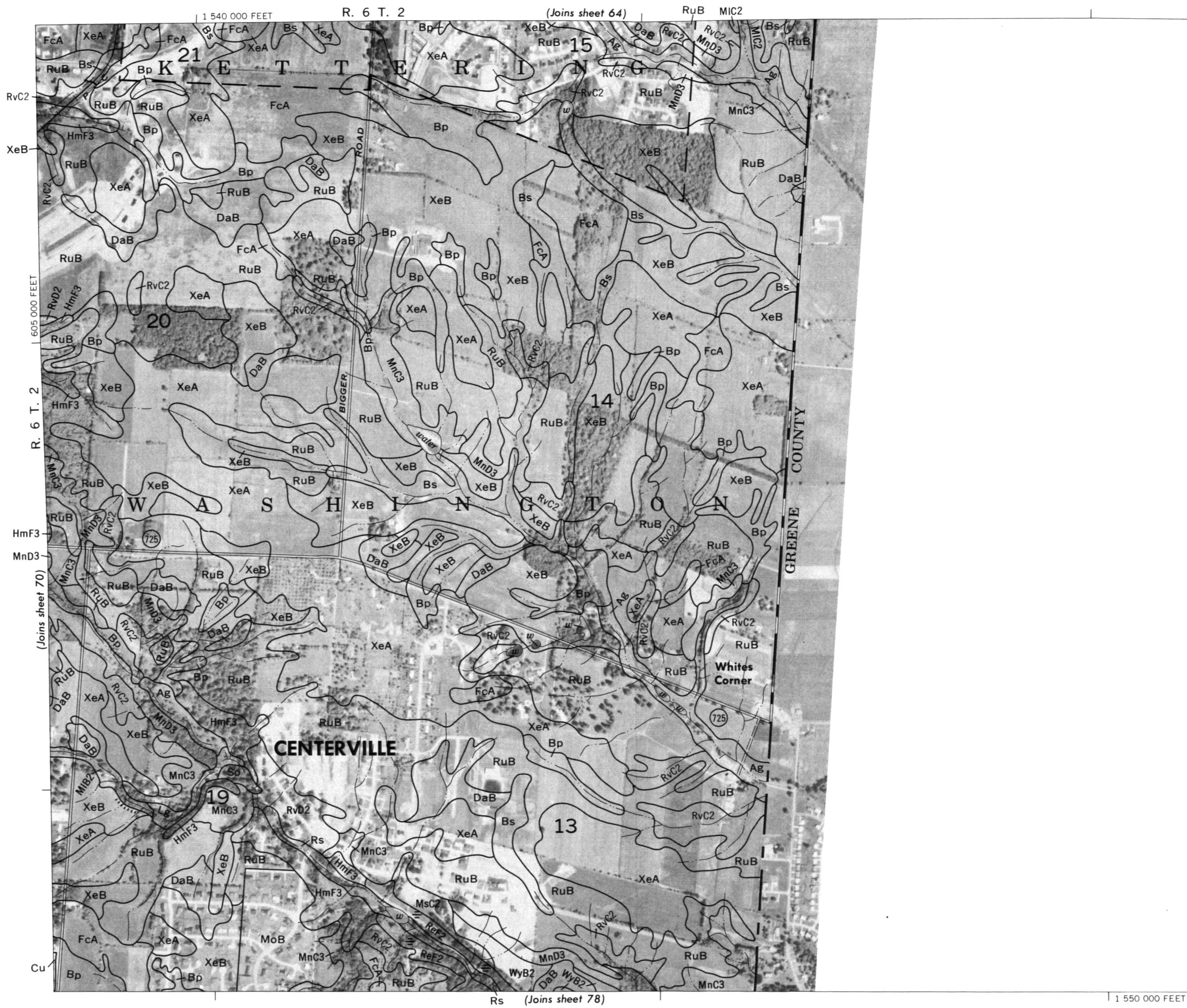
MONTGOMERY COUNTY, OHIO NO. 70

MONTGOMERY COUNTY, OHIO NO. 71

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.

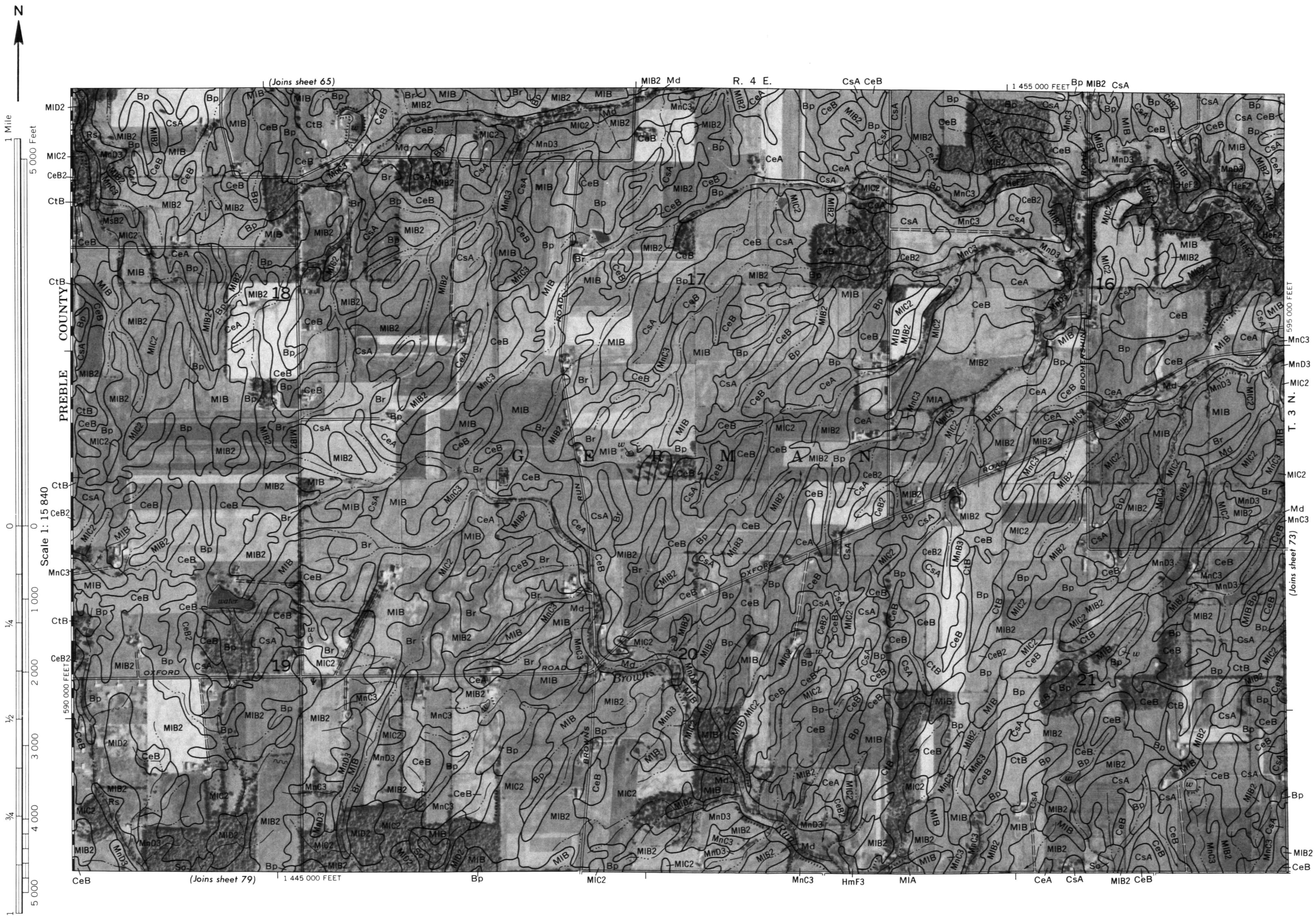


N

1 Mile

5 000 Feet

Scale 1: 15 840



Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

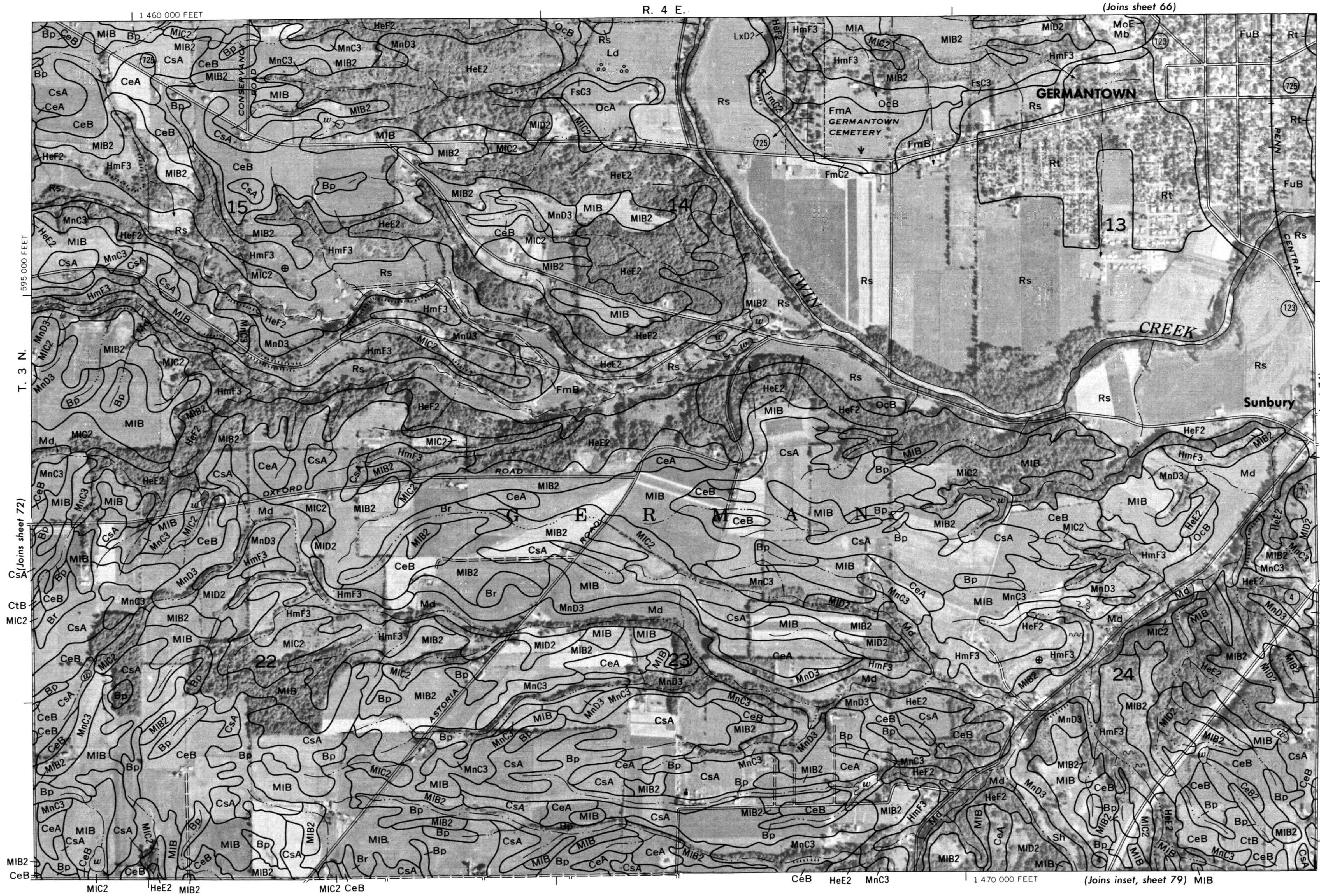
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 73

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.



N

Scale 1: 15 840

1 Mile ½ ¼ ¾ 0

5 000 Feet 0 1 000 2 000 3 000 4 000 5 000

N

1 Mile

5 000 Feet

Scale 1: 15 840

0 | 0

1 000

¼

2 000

½

3 000

¾

4 000

1 | 5 000

Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

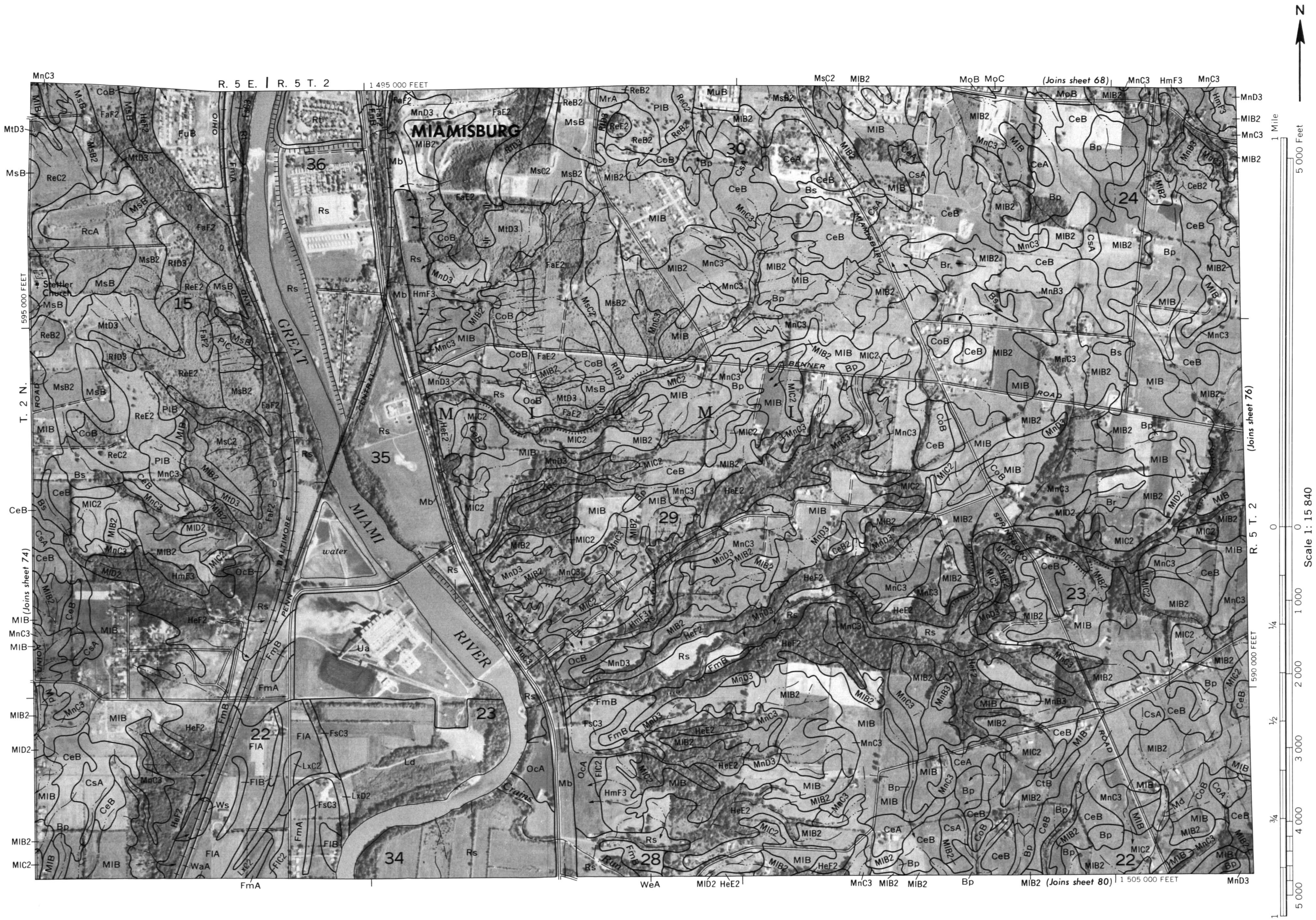
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 75

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.



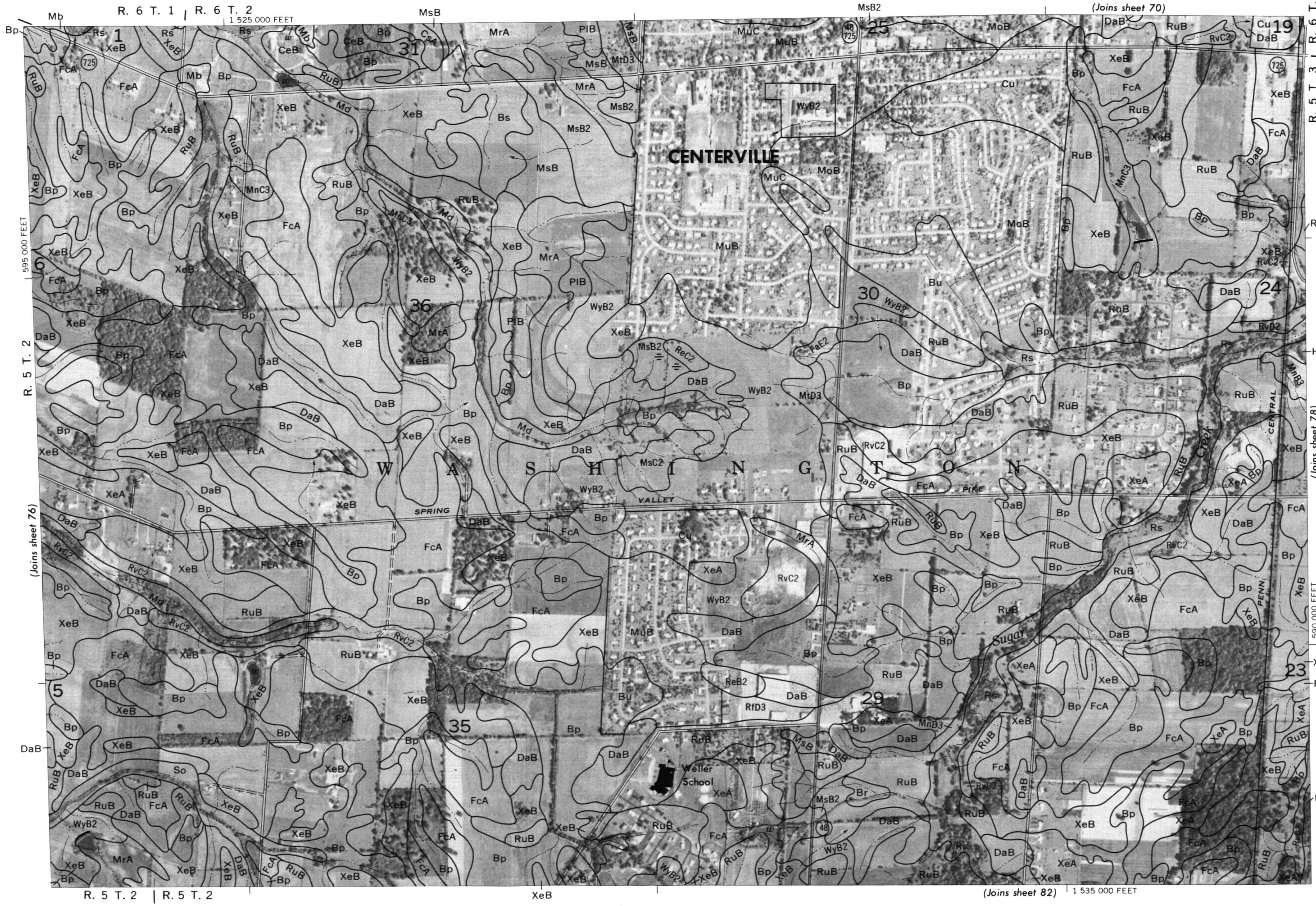
MONTGOMERY COUNTY, OHIO — SHEET NUMBER 76

Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

N

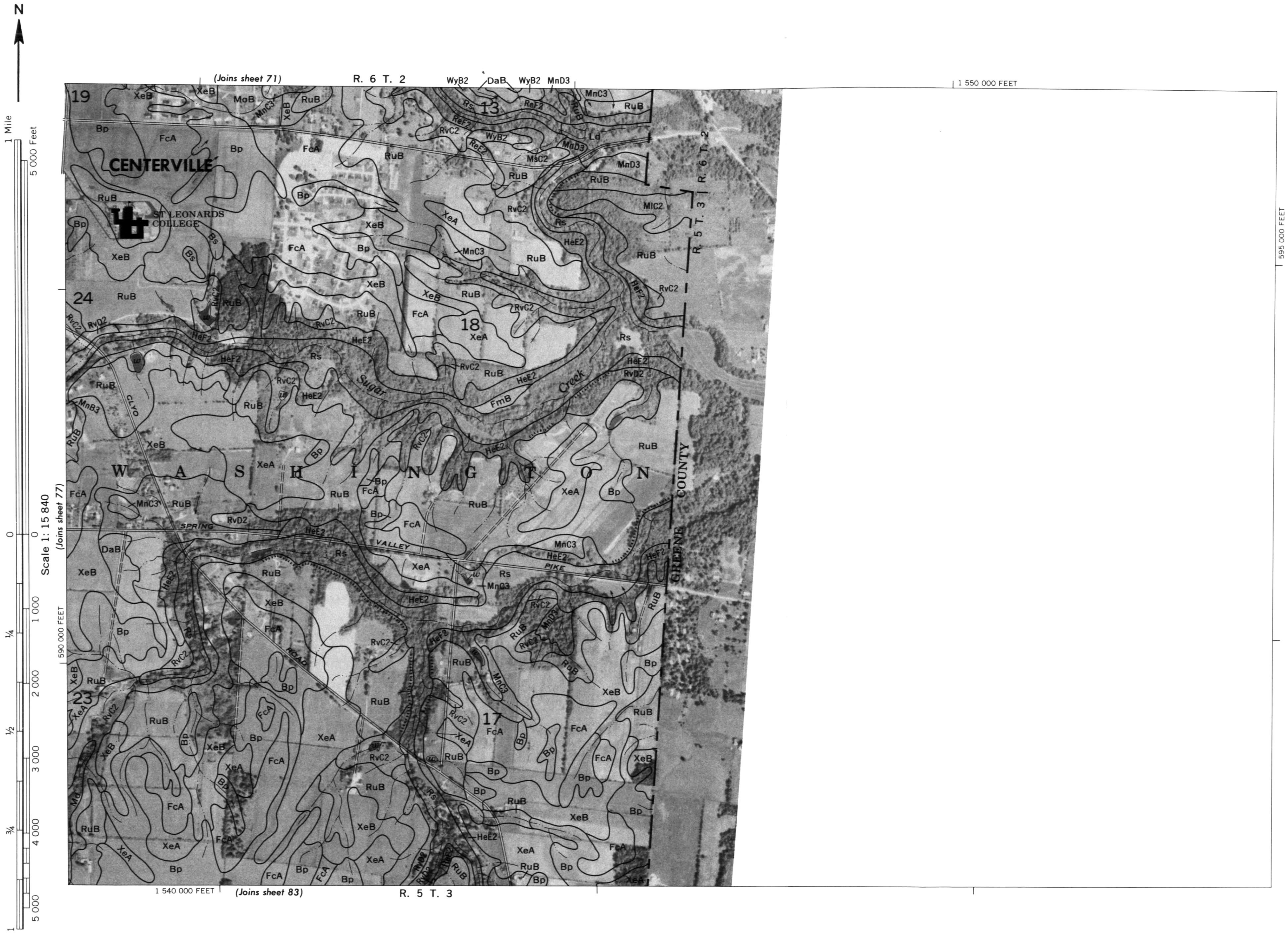


1 Mile
5 000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
Scale 1: 15 840

MONTGOMERY COUNTY, OHIO NO. 77

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.
Land division corners are approximately positioned on this map.

MONTGOMERY COUNTY, OHIO — SHEET NUMBER 78



Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 78

79

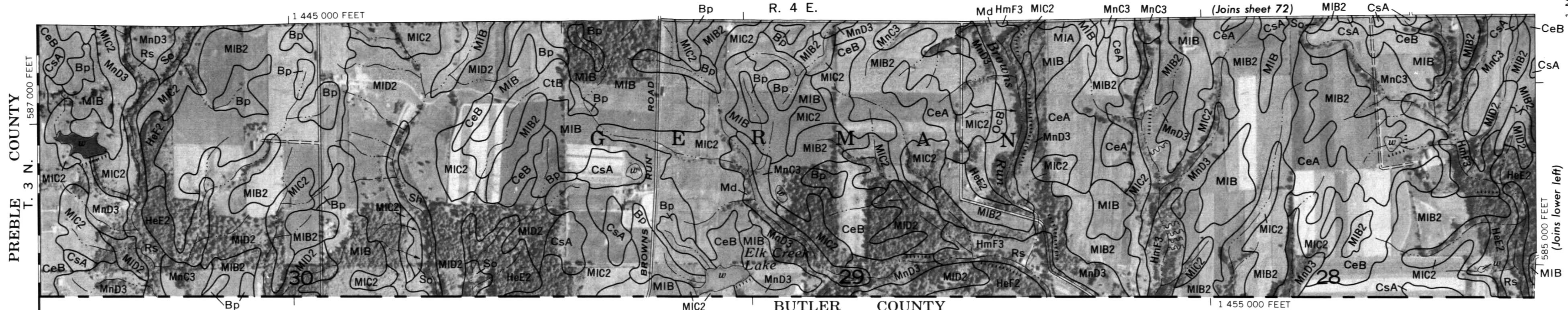
N

MONTGOMERY COUNTY, OHIO NO. 79

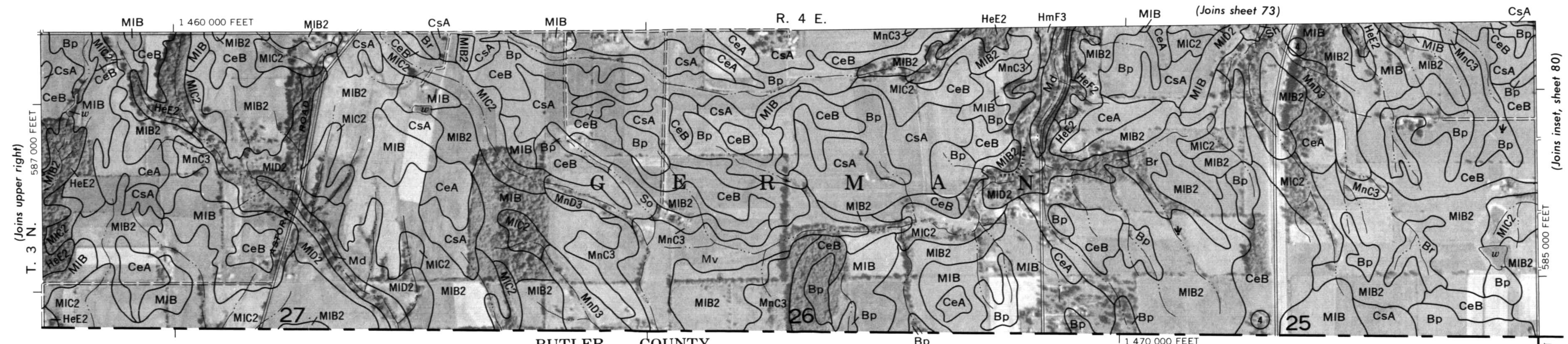
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.



2 000 AND 5 000-FOOT GRID TICKS



2 000 AND 5 000-FOOT GRID TICKS

1 Mile — 5 000 Feet

Scale 1: 15 840

Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

81

MONTGOMERY COUNTY, OHIO NO. 81

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.

Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

MONTGOMERY COUNTY, OHIO NO. 83

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, south zone.

Land division corners are approximately positioned on this map.